

REPORT OF THE COMMITTEE ON POTENTIAL
GROWTH AREAS

City of Alexandria, Virginia
August, 1975

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a report of the

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While all members of the Committee played some role in shaping the final report, some members devoted extraordinary time and effort to the project and made particularly valuable contributions. Those deserving special recognition include from the City staff Dayton Cook, Hans Jepson, Chuck Kenyon, and Cliff Rusch, and from the citizen members, Joe Berardelli, Kevin Heanue, Lois Hunt, Marlin Lord, John Williams, and Anne Coldsmith.

The Committee hopes that its study of potential growth areas will assist the City in dealing with difficult land use issues in the months and years ahead. Such issues are important to the life of the City, and we are grateful for having had the opportunity to make a contribution, however modest, to their intelligent resolution.

Bill Livingston
Chairman

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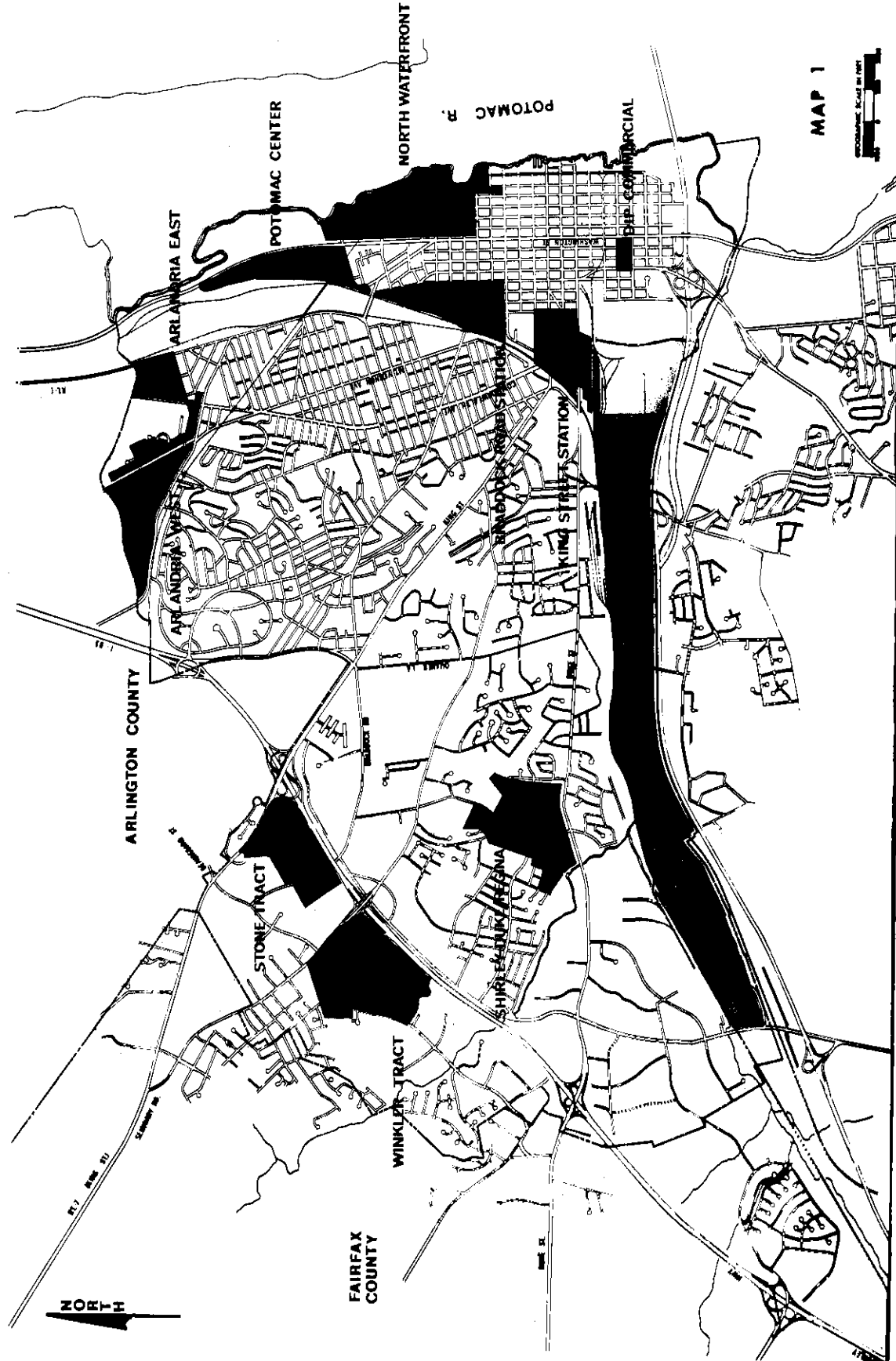
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CHAPTER I: INTRODUCTION

The resolution of December 26, 1973, creating this Committee adjured it to provide "a comprehensive picture of the effects, benefits and costs of potential growth" in each of ten areas. These areas, for the most part vacant or not fully developed, were among those previously identified by the Planning Advisory Committee as possible locations for the City's future growth (The ten growth areas and the Cameron Run Valley, which is being studied in a separate staff-consultant effort, are indicated on Map 1). The resolution was supplemented by Councilwoman Beidler's memorandum of November 2, 1973, by Vice Mayor Mitchell's remarks at Council's meeting of December 26, 1973, and by his comments at an early meeting of the Committee, all of which provided more specific direction to the tasks of identifying timing and impact of expected growth in these areas. The Committee has also heeded the resolution's admonition to consider other matters as appropriate.

The Committee comprised 18 members representing a broad spectrum of groups and interests. Six of its members were from the City staff, including the Directors of Traffic, Transportation and Environmental Services, Budget and Research, and Planning and Community Development, as well as the Deputy City Manager and the City's Environmental Engineer. The Committee had 12 citizen members, including representatives from the Planning Commission, the Planning Advisory Committee, the Environmental Policy Commission, the Beautification Committee, the Board of Architectural Review, the Traffic and Parking Board, and the Park and Recreation Commission.

The Committee, from the outset, focused its attention on the ten potential growth areas. The first step was consideration and analysis of detailed profiles of the nature and characteristics of each area, including such matters as present zoning and land use, natural constraints on construction, and capacities of nearby streets. Next, as explained more fully later in this report, a projection and approximate quantification of likely development were prepared for each area. From the projections of likely development, the Committee and staff then attempted to assess



LEGEND:

■ POTENTIAL GROWTH AREAS STUDY

■ CAMERON RUN VALLEY STUDY

CITY OF ALEXANDRIA

STUDY AREAS

the environmental and social impact of that development and the capacity of a variety of City services and facilities (such as streets and sewer lines) to handle such development. In addition, the direct costs to the City government of such development and the expected tax revenues for the City were estimated. Based on the study of each area, the Committee then agreed on various conclusions and recommendations with respect to potential growth. The Committee also measured the maximum amount of development permitted by existing zoning in each area and analyzed the impact of that development on the City. Finally, an effort was made to assess the combined effects of the likely development in all ten areas and to make overall recommendations based on these citywide impacts. While the Committee was by no means unanimous on all points, especially at the start, its conclusions and recommendations represent a substantial consensus. In making these recommendations, as well as recommendations in other sections of the report, the Committee was guided by its views as to what ought to occur, and in general did not concern itself with whether present law permits implementation of the recommendations. This latter task was entrusted to the Committee on Regulation of Growth, which was established contemporaneously with this Committee.

In order to complete its tasks, the Committee met over 40 times during a year and a half period to discuss and examine development and its impact on the City. In addition the Committee reviewed a surfeit of background information on regional population trends, the future of rapid transit, regional air pollution problems, and the like.

This report is the product of the Committee's deliberations. The first section of the report sets forth the recent historical record of Alexandria's growth and development and describes briefly the City's existing facilities and systems. The second section explains the methodology which was used to estimate the levels of development and the developments' impacts. The third section of the report separately analyzes each of the ten areas, and contains conclusions and recommendations with respect to each. This third section is by far the most important part of our report and should be read with care. It is followed by an analysis of the effects of development at the maximum level permitted by existing zoning. (A draft of this section was previously submitted to Council in May, 1975). The concluding section is an effort to view

the ten areas in their entirety, and contains certain general conclusions and recommendations with respect to overall development policies for the City.

Three general observations relating to the entire report are appropriately made at this point. First, this study principally involves predictions and therefore inevitably suffers from certain weaknesses, as would any such study, no matter how exhaustively prepared. In order to make these predictions, assumptions concerning future circumstances necessarily were made, some easy (e.g., that there will continue to be substantial demand for new housing and offices which private interests will be willing and in a financial position to satisfy) and some more difficult (e.g., automobiles in the near future will continue to be the principal method of transportation). These assumptions and predictions are for the most part based on past experience, an imperfect guide at best. The frailty of this approach is compounded by the process of piling predictions of future impacts on top of predictions of future growth. But the making of assumptions and predictions inheres in the planning process and is unavoidable. What is important is that the assumptions be informed, not whimsical or arbitrary. While we have no doubt that our predictions will not all come to pass (indeed hope that steps will be taken to prevent some of them), we believe them to be reasonable, soundly based on present trends and existing circumstances, and a proper basis for rational decision-making.

Second, the report contains and relies on several numerical analyses of growth and its impact. These numbers in their complexity may at first bewilder and, worse, once understood, beguile. It is essential that the reader not be mesmerized by these numbers or accept them as anything more than a useful guide. Their purpose is to focus debate and to provide a common basis for discussing and resolving larger issues of land use policy. They are no substitute for judgment, nor could further refinement make them so. In addition, many important factors relating to matters in this report cannot be quantified, or are frankly political, and thus are not included in the many tables in this report. This omission, of course, does not denigrate their importance nor give cause to ignore them.

Third, we urge that the City act promptly on this report and not use it simply as a basis to commission further studies.

This report, as with any planning document, is transitory. As underlying conditions and attitudes change, the report will lose its value. More importantly, substantial development is already occurring in a number of the areas involved in this study and will continue to do so. If the City wishes to control that development, it must do so now, and if this report is to serve any function, its recommendations ought to be acted on now.

CHAPTER II: BACKGROUND

Recent Population Trends in the Metropolitan Area

Between 1960 and 1970, the Washington Standard Metropolitan Statistical Area¹ grew more rapidly than any other metropolitan area of similar or larger size in the eastern half of the nation. The rate of growth, 38 percent, was slightly greater than the growth rate of the 1950's (34 percent), and by 1970, the metropolitan area had reached a total population of 2,908,801. Since 1970, population has slowed from its 3.8 percent annual growth rate of the 60's to 1.2 percent annually, increasing by only 152,000 to 3,061,000, between 1970 and 1974; the growth rate of the SMSA has nevertheless remained above the national average (Table 1).

Table 1

Growth in the Washington Metropolitan Area
and in the United States, 1950-1974¹

Year	SMSA ² Population	Average Annual % Increase	United States Population	Average Annual % Increase
1950	1,507,848	-	151,325,798	-
1960	2,109,182	3.4	179,323,175	1.9
1970	2,908,801	3.8	203,211,926	1.3
1974	3,061,000	1.2	211,872,000	1.0

¹The sources for this table and all other tables and figures in this chapter are, except where otherwise noted, the U.S. Census for 1950, 1960, and 1970 data and the Washington Center for Metropolitan Studies Trends Alert report for 1974 data.

²As defined in 1970, the Washington "standard metropolitan statistical area" (SMSA) includes the District of Columbia, Montgomery County, Prince Georges County, Arlington County, Fairfax County, Prince William County, Loudoun County, and the Cities of Alexandria, Falls Church and Fairfax. Since 1970, Charles County has been added to the SMSA, but for comparability with earlier years, the 1974 figures are for the SMSA as defined in 1970.

The recent decline in the rate of growth reflects some nationwide trends, and others which are peculiar to the area. In the former category are the decline in the birth rate and the large increase in the proportion of young, unmarried adults. The more localized considerations include a higher ratio of young women to young men in the area and the slowing rate of immigration. The migration rate has been retarded by such factors as the declining rate of increase of the federal government work force and the spread of suburbanization beyond the 1970 Census-defined SMSA boundaries.

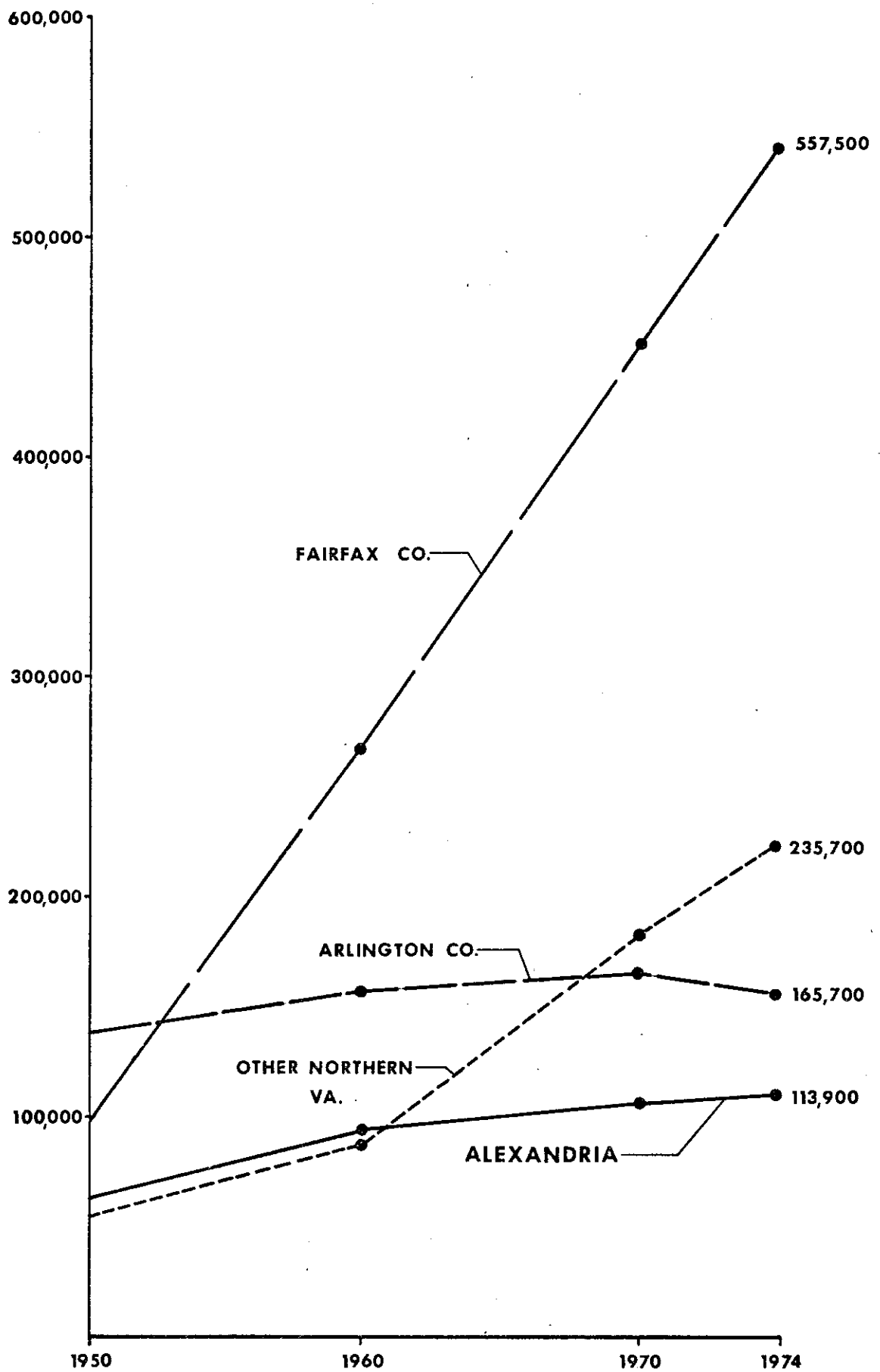
Within this context, very significant shifts in the population trends within various sectors of the area have occurred (Table 2, Figure 1). The northern Virginia sector is slowly increasing its share of the total SMSA population from 29.1 percent in 1960, to 31.7 percent in 1970, and to 35.0 percent in 1974. This trend for growth to shift west of the Potomac has accelerated in recent years; of the three major jurisdictions east of the river, only Montgomery continued to increase after 1970 while both the District and Prince Georges County declined. Of all the SMSA jurisdictions west of the Potomac, however, only Arlington declined in population. Fairfax County, with a population increase of 102,500 persons, was the only major jurisdiction in the entire metropolitan area to show an accelerated rate of gain during the early 1970's.

Table 2

Distribution of the Population by Jurisdiction

	<u>1960</u>		<u>1970</u>		<u>1974</u>	
	(1000's)	%	(1000's)	%	(1000's)	%
Total Metro Area	2109	100	2908	100	3061	100
District of Columbia	764	36	757	26	722	24
Maryland Suburbs	731	35	1231	42	1266	41
Virginia Suburbs*	614	29	921	32	1073	35
Alexandria	91	4	111	4	114	4
Arlington County	163	8	174	6	166	5
Fairfax County	275	13	455	16	558	18

*Includes Loudoun and Prince William Counties and Falls Church and Fairfax cities in addition to Alexandria, Arlington, and Fairfax County.



POPULATION TRENDS IN NORTHERN VA., 1950 - 1974

FIGURE 1

Because of the continuing decline in average household size, the rate of growth of households has not slowed as much as population growth. While the annual population growth rate of the 1960-1970 period declined by 69 percent to the 1970-1974 annual rate, the annual growth rate for households declined by only 44 percent. In the metropolitan area as a whole, average household size decreased from 3.28 (1960) to 2.91 (1974). Within the Northern Virginia jurisdictions, Alexandria's household size declined from 3.15 to 2.39, Arlington's from 2.90 to 2.26 (lowest in the metropolitan area), Fairfax County from 3.97 to 3.31 (highest in the area). If average household size in the City continues to decline, substantial new residential construction will be required to accommodate a stable or modestly increasing population.

Trends in the City of Alexandria

Within recent years, Alexandria has gradually become a part of the "center city". The City's new role as part of the urban core of the metropolitan area is reflected in recent trends in the character of its population, housing supply, labor force, and work force. The more significant of these trends are discussed briefly below and are highlighted by use of maps and graphs.

(1) The total City population grew from 61,787 in 1950 to 113,900 in 1974. The annual rate of increase declined from 4.8 percent (1950-1960), to 2.2 percent (1960-1970), to .5 percent (1970-1974). Although the City's total population increased only slightly between 1970 and 1974, the number of non-whites increased at an average annual rate of 15.5 percent, reaching 24.9 percent of the total by 1974 (Figure 2).

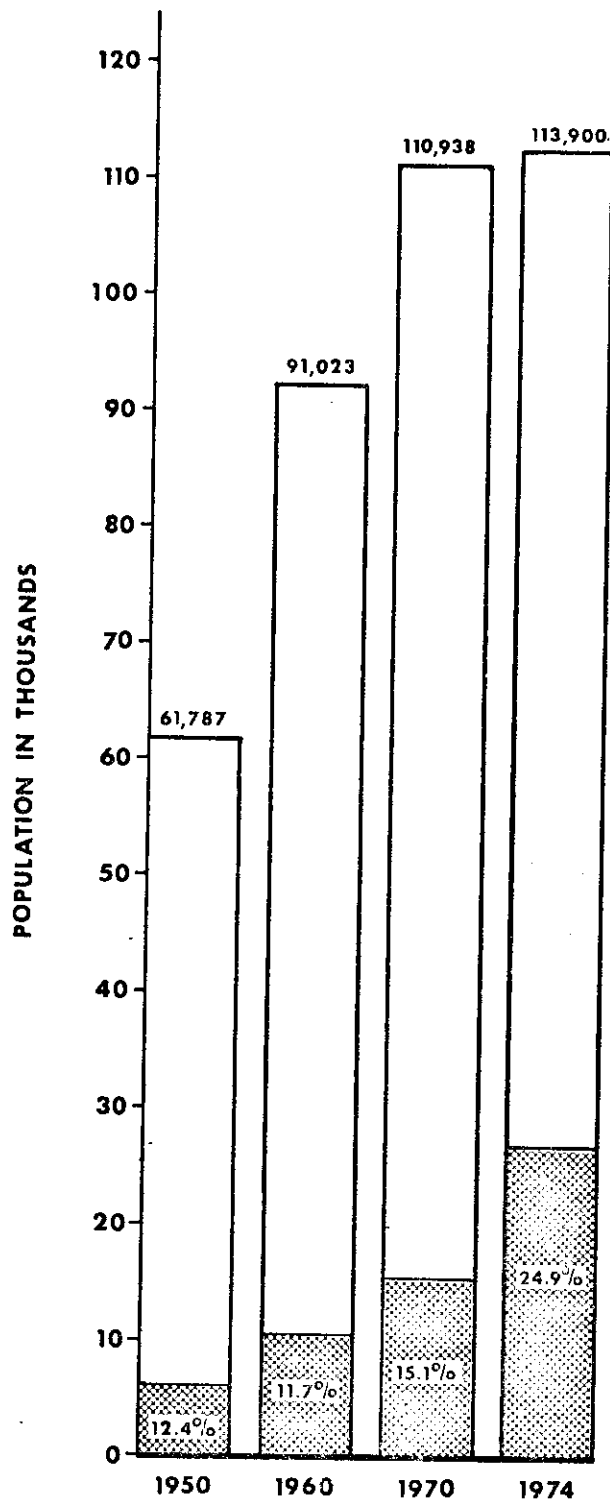


FIGURE 2
POPULATION TRENDS IN ALEXANDRIA
1950-1974

NON WHITE
WHITE

(2) Average household size declined from 3.15 (1960) to 2.57 (1970), and to 2.39 (1974) (Figure 3). Primarily because of the .18 decline in household size 1970 - 1974 population grew by only 3,000 persons while the number of households (in new dwelling units mainly) increased by over 4,500. As an indication of Alexandria's more rapidly changing residential role, its average household size has declined more than most other jurisdictions in recent years. Between 1960 and 1970, Alexandria had the largest rate of decline in the metropolitan area, and was exceeded only by Prince Georges County in the 1970-1974 period. The principal factor in the decrease in household size has been the increase, from 12.5 percent in 1960 to 30.6 percent in 1974, of one-person households.

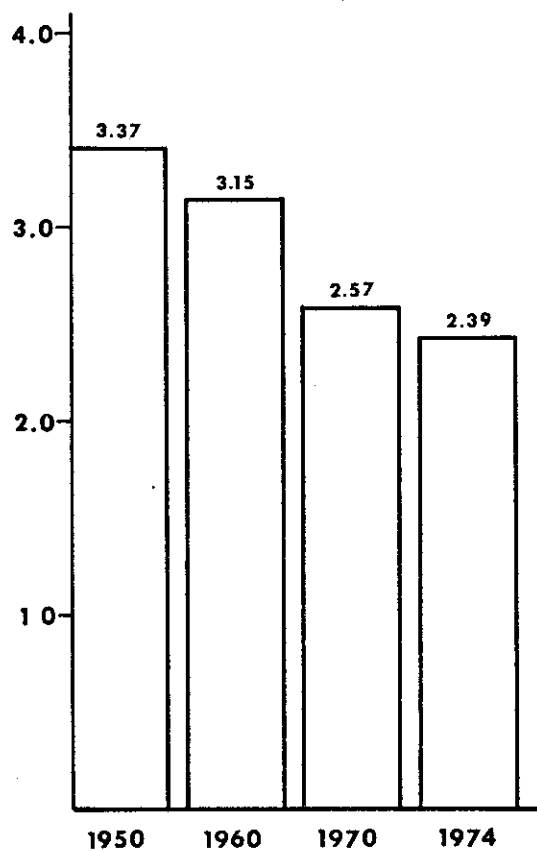
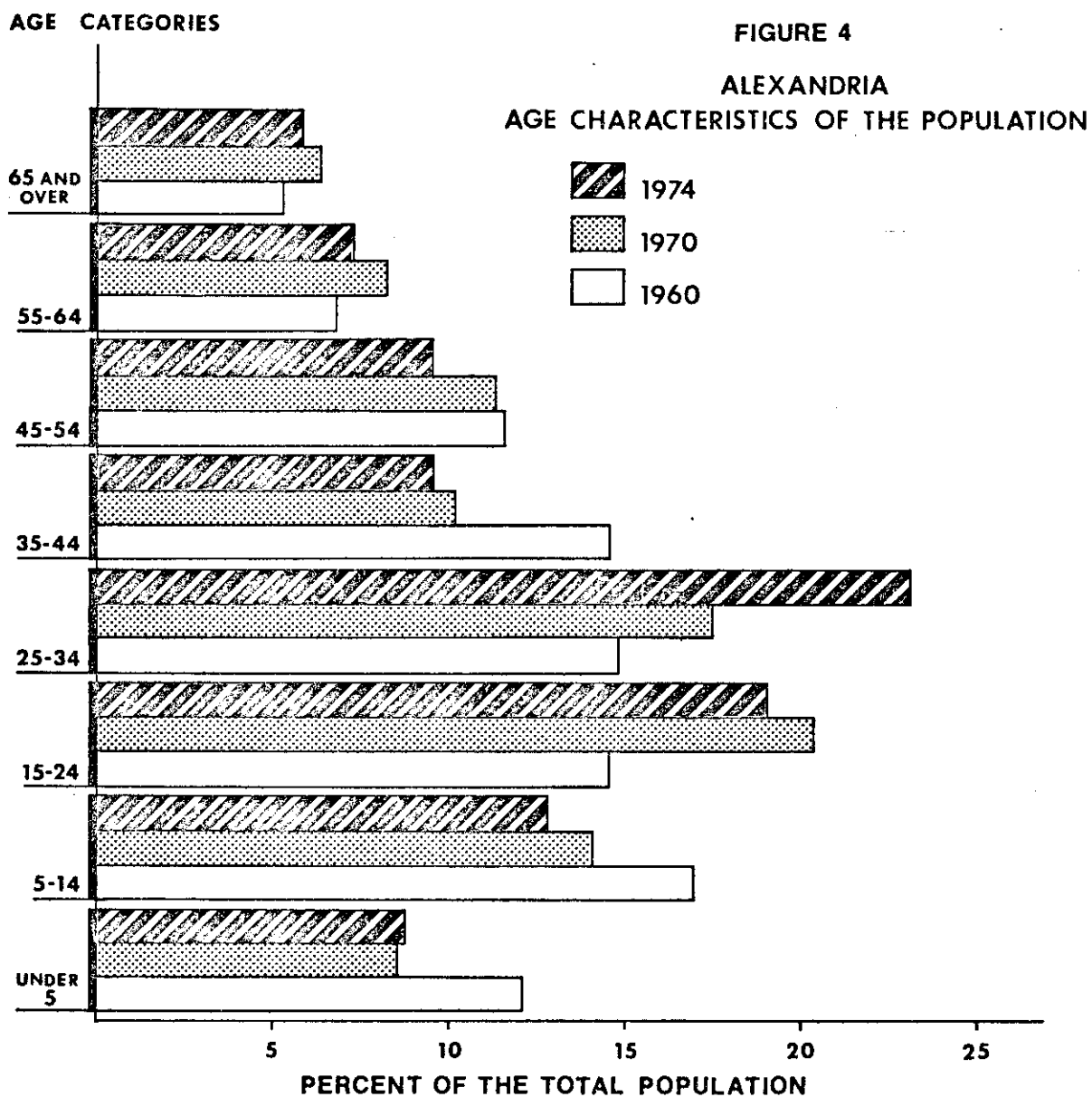


FIGURE 3
ALEXANDRIA
AVERAGE HOUSEHOLD SIZE

(3) Between 1960 and 1970, young adults and the elderly increased their share of the population while middle aged adults and school-age children declined in numbers. In the 1970-1974 period, the proportion of young adults continued to increase, while population in most other age categories declined or remained relatively stable (Figure 4).



Reflecting the changing character of the City's population is the trend in public school membership, which mirrors the trend in the 5-14 age group. Public school membership increased rapidly through the 60's reaching a peak in the 1968-1969 session before dropping to below the 1960-1961 level for the 1973-1974 session (Figure 5). These trends do not reflect increases in the numbers of students attending private schools; the proportion of school age children attending private schools has remained almost stable in recent years.

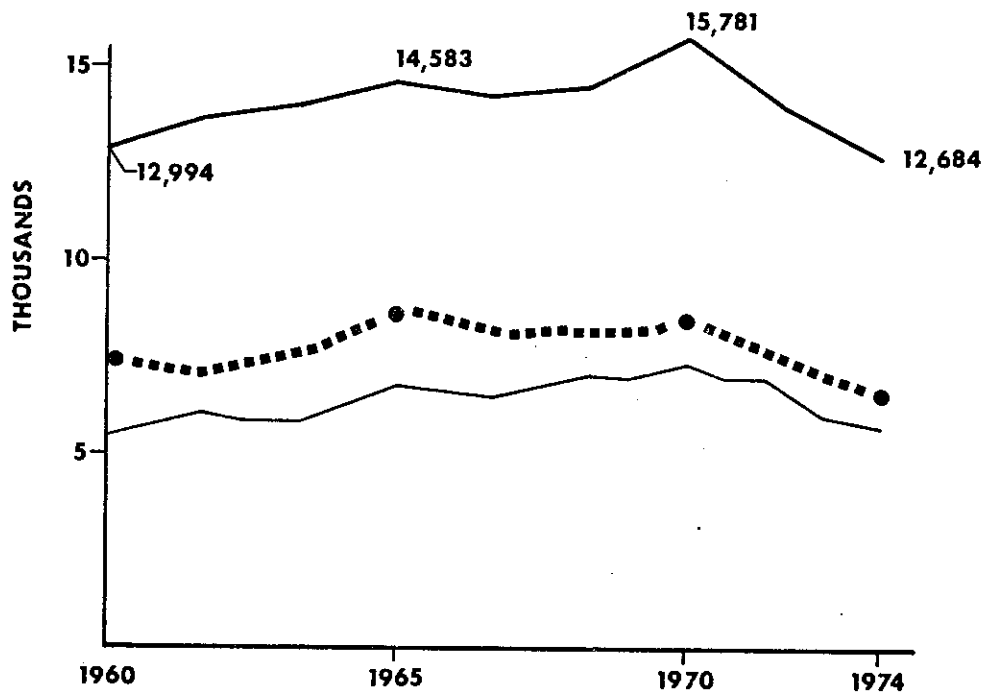
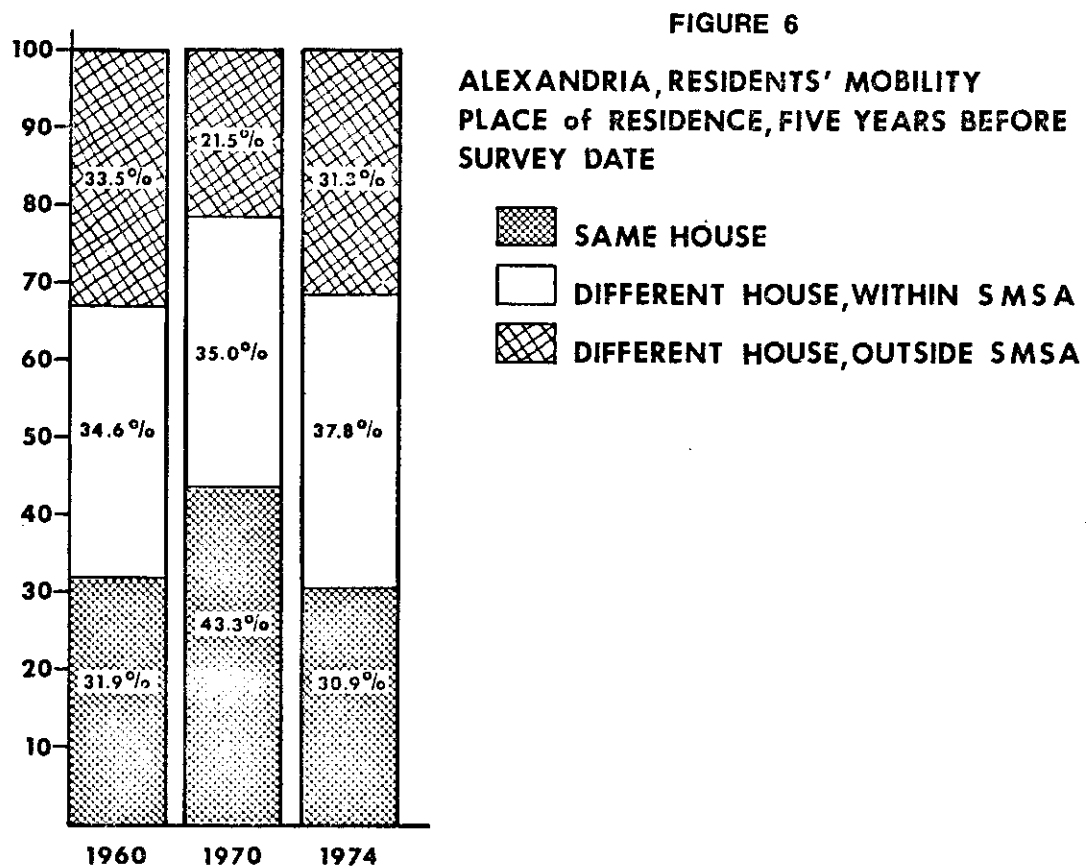


FIGURE 5

TRENDS in PUBLIC SCHOOLS' MEMBERSHIP, 1960-1974
AS of JUNE of EACH YEAR

— 1-12
- - - 1-6
— 7-12

(4) In 1970, Alexandria's population was as transient and mobile as that of other jurisdictions in the metropolitan area. The 1970 Census indicated that about 50 to 60 percent (depending on the jurisdiction) of households had changed residences in the preceding five years (Alexandria was about average with 56.7 percent having moved). However, of the four jurisdictions for which 1974 mobility data is available, only Alexandria's residents' mobility increased, with 69.1 percent of the 1974 residents moving to a different house since 1970 (the other jurisdictions - Montgomery, Prince Georges, and Arlington Counties - showed about the same degree of mobility as in 1970). The recent trend to shorter-term residency and greater mobility reflects the City's new role as part of the urban core (Figure 6).



1

(5) Construction since 1950, and especially since 1960, has become increasingly weighted toward multi-family, rental units (Figures 7 and 8). (The very recent trend to condominiums has not yet become apparent in the data on housing tenure.) Garden apartment construction began in the 1940's (Map 2) and in the decade of the 1950's there were almost as many garden apartment units added as there were single-family units. In the 1960's, garden apartment construction was almost equalled by high-rise construction, the two constituting almost 97 percent of new residential construction. Since 1970, there have been more garden apartments than high-rises built, but among units under construction high-rises are now far more numerous, and it seems that this form of construction has become dominant in the few areas of the City where substantial vacant land remains (Map 3). Subdivision of land for single-family homes in the area annexed in 1952 was largely completed by the mid-60's; there has been only one major subdivision since then (Map 4).

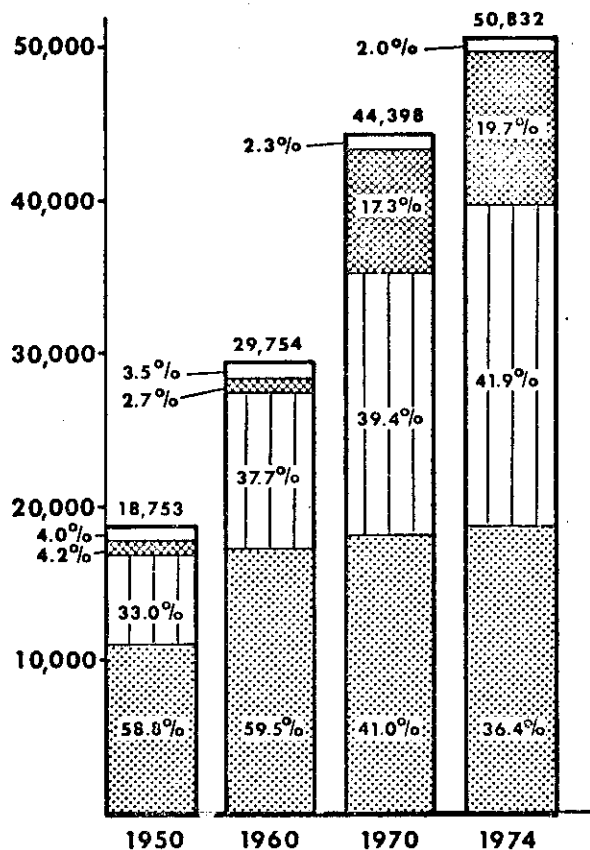


FIGURE 7
ALEXANDRIA, TOTAL DWELLING UNITS

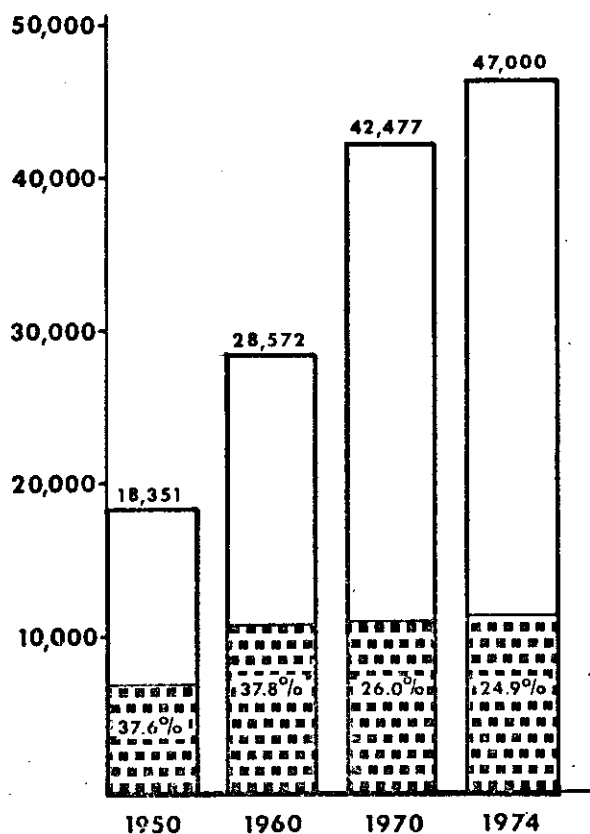


FIGURE 8
ALEXANDRIA, TENURE OF OCCUPIED DWELLING UNITS

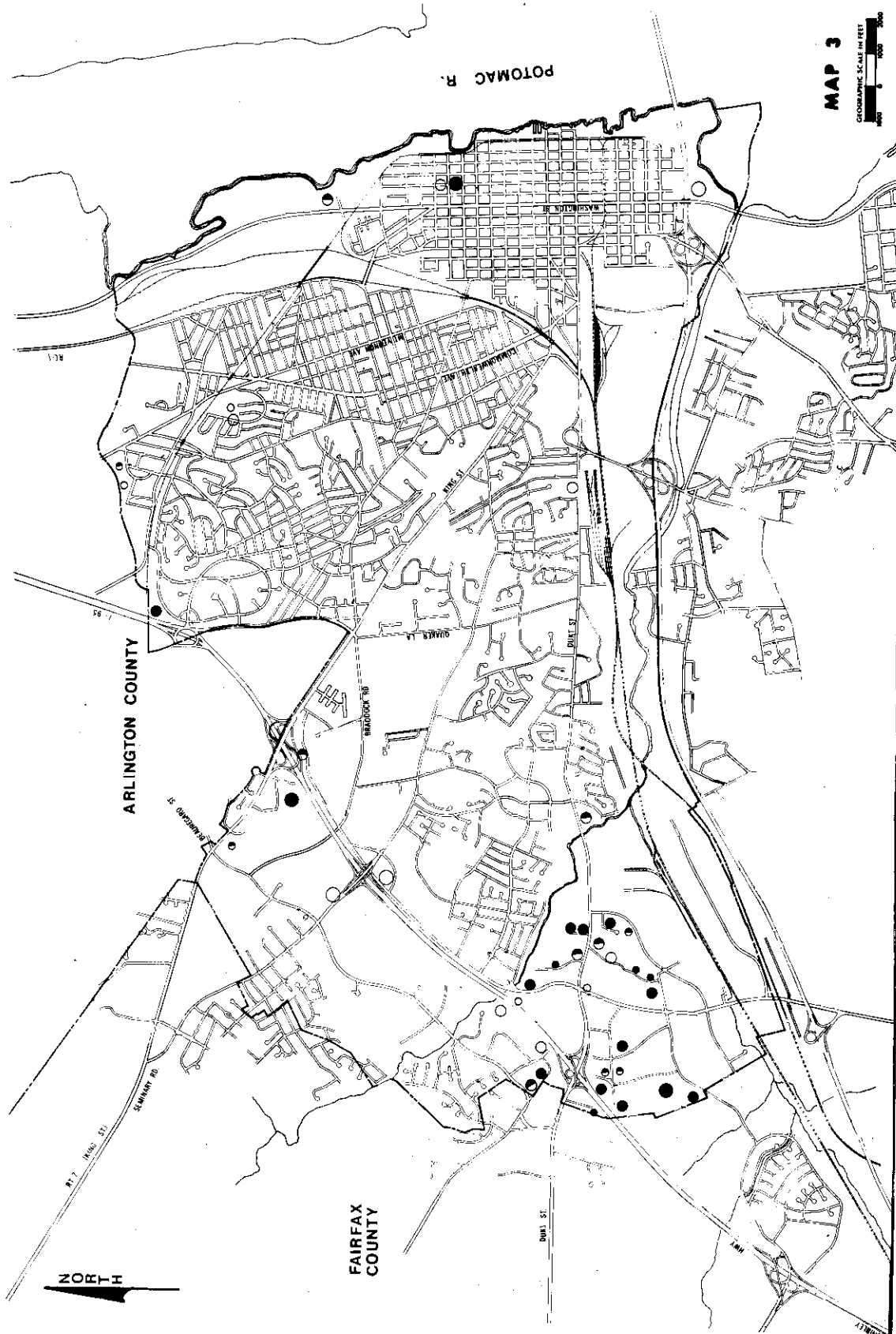


CITY OF ALEXANDRIA GARDEN APARTMENT DEVELOPMENTS.

LEGEND:

- 20-100 units
- 101-300 units
- 301-500 units
- 501-1000 units

BUILT BEFORE 1950
 1950 - 1964 inclusive
 1965 - 1974 including those still under constr.



CITY OF ALEXANDRIA HIGH-RISE RESIDENTIAL DEVELOPMENTS.

CONSTRUCTED BEFORE 1965
 CONSTRUCTED 1965 - 1969
 CONSTRUCTED 1970 - 1974
 INCLUDING THOSE UNDER CONSTRUCTION, 1974



CITY OF ALEXANDRIA

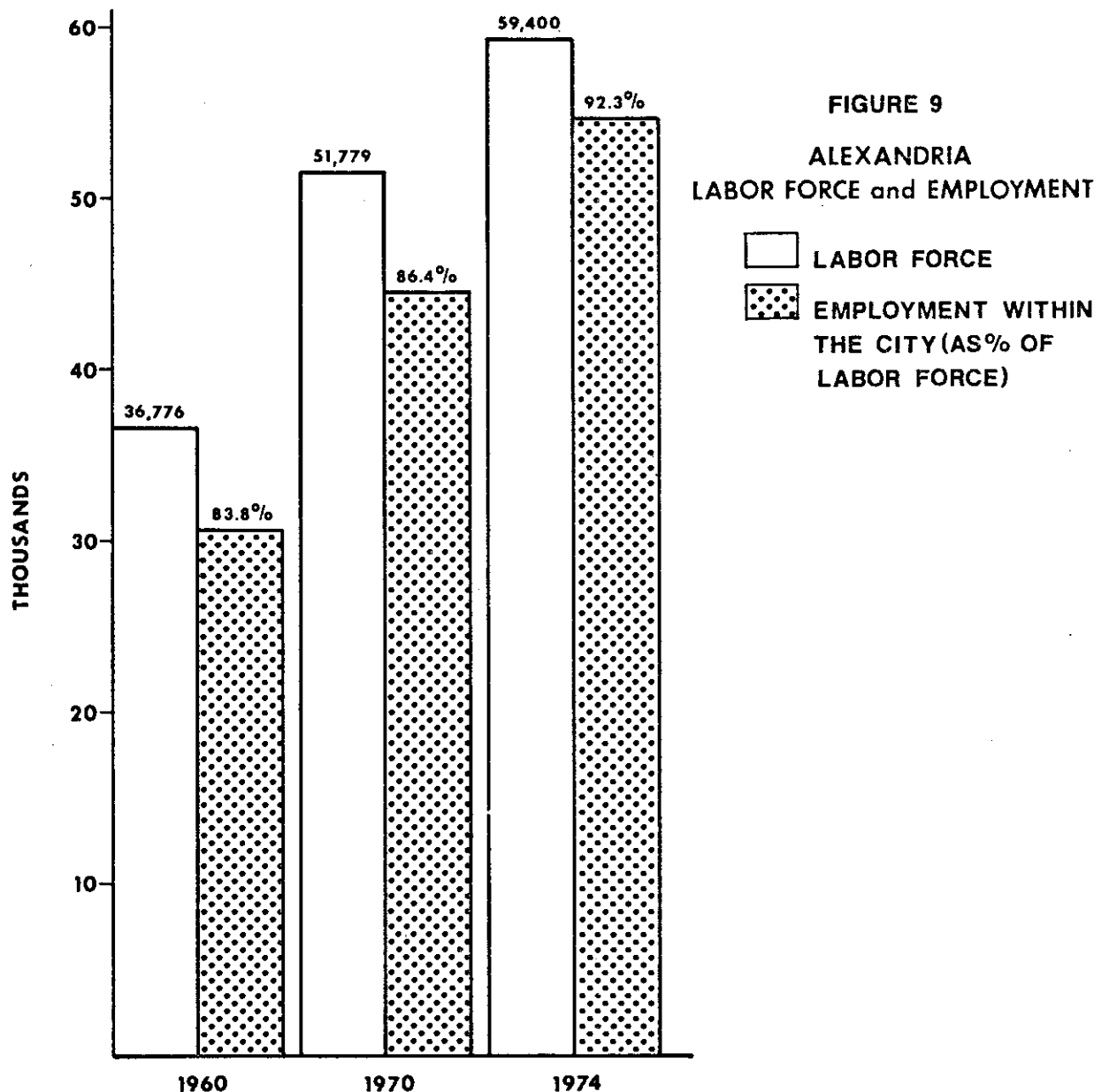
SINGLE-FAMILY SUBDIVISIONS. **1952-1974. 5 LOTS OR MORE / FOR PRIVATE DEVELOPMENT.**

LEGEND:

1952-1965
 1966-1974

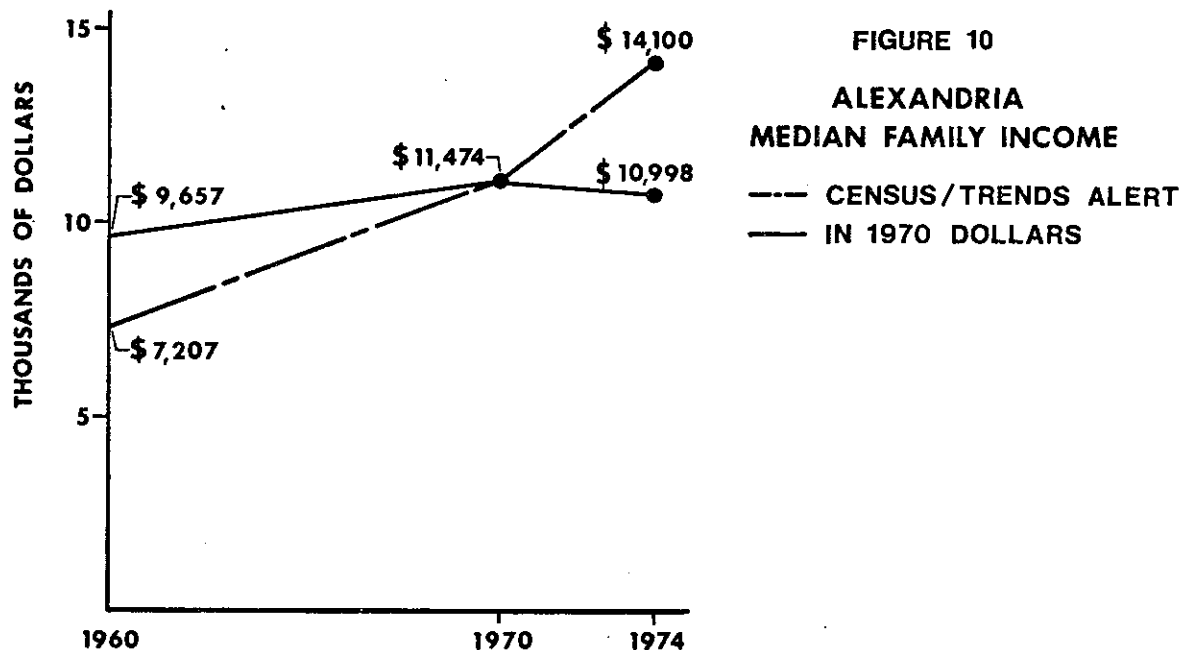


(6) The City's labor force (i.e., employed residents) grew to 59,400 persons in 1974 (Figure 9). The rate of increase for 1960-1970 (4.1% annually) was almost twice the population growth rate. The 2.9% annual rate of increase for 1970-1974 was six times the rate of population increase for that period. Alexandria's more rapid rate of labor force growth is a primary characteristic of center cities, resulting from the larger number of young adults, single heads-of-households, and dual-income households. Over half of the adults living in Alexandria (52.2%) are employed.



The City's work force (those employed in the City) increased more rapidly (4.5% annually) than did either population or labor force during the 1960-1970 period (Figure 9). Since 1970, the annual rate of growth of the work force has increased to 5.1 percent, primarily as a result of the occupancy of several major new Federally-leased office buildings. By 1974, work force had risen to 92.3 percent of the labor force. It is apparent that Alexandria is beginning to assume a role as an employment center formerly played primarily by the District and Arlington. Continuation of this trend will depend to a great extent on whether federal policies favor decentralization of government offices in the future.

(7) Despite the higher percentage of working adults, the median family income of Alexandrians declined in the 1970-1974 period, after income levels are adjusted to reflect inflation's effect on the value of the dollar (Figure 10).



Causes of Growth in the City

Two sets of factors have caused growth in Alexandria over the past several decades. The first set relates to the City's location in a large metropolitan area which has been growing rapidly. As part of such an area, Alexandria has received a portion of the growth. At this level of explanation, "causes" of growth in the City are those that are generating growth in the metropolitan area as a whole. These include the general phenomenon of rural outmigration/urbanization and the characteristics which have allowed the Washington area to grow even more rapidly than most other metropolitan areas: rapid growth in federal employment, and the metropolitan area's emergence as a major center for businesses requiring close contact with the federal government.

The second set of factors relates to Alexandria's position within the metropolitan area. Alexandria competes with other jurisdictions for a share of the overall growth, and the size of its share is affected by many factors such as the availability of vacant land, location relative to employment centers (i.e., commuting times and costs), land values, and growth policies as reflected in comprehensive plans and zoning ordinances.

In the early period of rapid metropolitan growth, Alexandria benefited from the prevailing suburbanization trend because the 1952 annexation had made available a substantial amount of vacant land suitable for single-family subdivision (Note in Figure 7 that single-family housing was the dominant type of residential construction in the 1950's). By the early '60's, however, most of this land had been developed; remaining vacant land was zoned primarily for medium and high-intensity use. The result was that the City's growth prospects and role began to change rapidly; multi-family construction occupied by smaller households became dominant.

Alexandria might have captured less growth in the late '60's and early '70's had Fairfax County not begun restrictive growth policies during this period. Developers have continued to receive a relatively favorable reception in Alexandria while sewer moratoriums and restrictive zoning regulations have been adopted in the County. City policies favorable to

growth have been complemented by rising land values allowing redevelopment of land in low intensity or marginal uses. The role of more recent and more speculative factors, such as the energy crisis, in causing growth is difficult to identify; however, it is probable that the energy shortage and accompanying higher gasoline prices favor (however slightly) Alexandria and other close-in jurisdictions.

Evolution of City Policies Since World War II

City efforts to establish or to redefine growth policies have occurred periodically in response to changing population, economic, and construction trends. This study is part of a current review of City policies and regulations concerning growth. Some of the previously defined City policies are discussed briefly below. They show the transitory nature of such policies, the need for regular revision to meet changing circumstances, and, more specifically, that some of the earlier policies have been implemented by codification and thus must still be observed today.

The 1951 rewriting of the zoning ordinance, motivated in part by the impending 1952 annexation, contains the first major set of growth policies of the post-war period. The Committee which drafted the ordinance made a conscious decision to write liberal regulations placing minimal constraints on development and thus encouraging expansion of the City's tax base. The height regulations and F.A.R.'s which were adopted indicated that the City would encourage very different, and much more intense, development that had occurred prior to that time.

Perhaps even more important than the written regulations was the mapping of the zoning districts. Although the 1951 mapping was not based on a City-wide land use plan, it was in fact the combined existing land use map and land use plan of its day, because the boundaries of districts reflected both existing use patterns and the perception of how the City should develop in the future.

The City adopted its first comprehensive plan in 1962. In its major elements, the plan supported the land use pattern (and densities) established by the 1951 zoning map and ordinance. For example, the plan envisioned perpetuation of

port and industrial activity along the waterfront, industrial use in the Cameron Valley, and high-intensity uses, including several major commercial centers, along the Shirley Highway corridor. Since this land use pattern had already been codified in the 1951 ordinance, few changes resulted. Of the few significant changes recommended - for example, higher density redevelopment in parts of the western half of Planning District I - most were not implemented because of lack of market support or public opposition. Within the Landmark area, however, the plan's provisions did establish the basis for rezoning several large single-family or industrially-zoned tracts to RC or C-2 designations.

After the 1962 plan's adoption, there was some remapping (based on the plan), and the City created a number of new zones. The adoption of a waterfront land use plan in 1967 (the only major amendment to the '62 plan), accompanied by creation of two new zones for waterfront commercial (WCR zone), and waterfront residential uses (WT zone), evidenced major changes in thinking about the future use of the waterfront area. Some of the other zones created at various times in the '60's include the C-1-B, C-2-B, RD, C-4, and CO zones. Although creation of these zones in most cases was based on policy decisions, their creation was insufficient to effect implementation of the policies. Most of the zones have been rarely used, because previously existing zoning designations allow more intense development. In addition, many of the policies on which creation of the zones were based (WCR and WT zones, for example) have been superseded while in other cases the zones were poorly structured (for example, RD), or were overly restrictive (C-4) and therefore have been used sparingly, if at all.

Perhaps the major policy step to occur between adoption of the 1962 plan and adoption of the current plan in November 1974, was the 1970 amendment to the CO zone. Prior to 1970, the CO zone was a standard commercial office zone. The amendment provided for high-intensity mixed use developments on parcels of two acres or more, subject to City Council approval of a unified development plan. This change represented a major effort to obtain better design of large developments and to give the City more control over parcels involved in rezonings from I-1, I-2, or lower density zoning districts. However, because the review process is time consuming and because the existing zone usually allows

high-intensity development, developers have submitted plans infrequently and they have been approved even less often. As of this writing, only five CO applications have been approved, and of these only one is under construction.

In April, 1969, City Council responded to the need to revise the 1962 plan by appointing a Planning Advisory Committee to prepare a new plan. In the decade of the '60's, high-rise construction had become a major component of new construction activity, increasing land values had made redevelopment feasible, vacant land was decreasing rapidly, and anti-growth policies in outlying areas had attracted increasing numbers of developers to the City. The City Council saw a need to reconsider the proposed uses of areas such as the waterfront and Cameron Run Valley, and to establish growth policies to guide the emerging development trends. Council also began to hold periodic conferences at Airlie to consider (among other things) matters related to the City's physical development, to debate interim reports received from the Planning Advisory Committee, and to establish new study groups to investigate specific areas of concern.

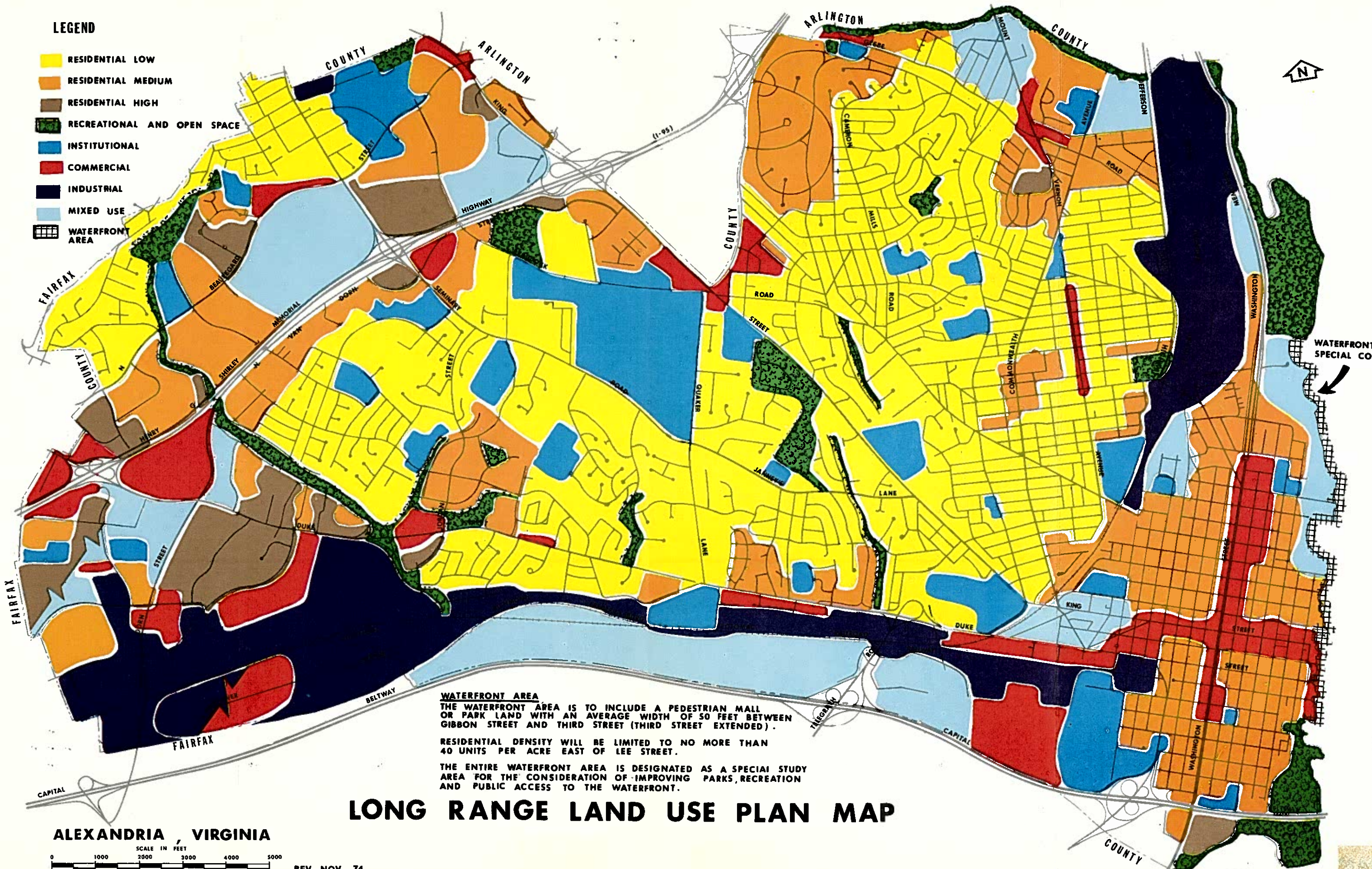
After more than five years of Committee deliberations, public hearings, and revisions, City Council adopted the new plan. The plan's text and maps showed many policy changes, some affecting the City as a whole and others affecting individual planning districts or neighborhoods. The "Long Range Land Use Plan Map" (Map 5), and the "Major Thoroughfare Plan" (Map 6) embody many of the new policies. Two of the major policies arising from the plan (the two which are most relevant to the work of the Potential Growth Areas Committee) are the development potential concept and the mixed use development concept.

As presented in the PAC report, the development potential concept involves designation of development potential areas into which most future growth might be channeled, while other areas of the City are held relatively constant in population and land use. The Planning Advisory Committee identified nineteen such areas (shown on the "Existing Land Use Map" of the PAC report - Map 7), made some general recommendations about their development, and suggested that a more detailed study of the areas be done.

The adoption of the "mixed use" concept, and its

LEGEND

- RESIDENTIAL LOW
- RESIDENTIAL MEDIUM
- RESIDENTIAL HIGH
- RECREATIONAL AND OPEN SPACE
- INSTITUTIONAL
- COMMERCIAL
- INDUSTRIAL
- MIXED USE
- WATERFRONT AREA



WATERFRONT AREA
 THE WATERFRONT AREA IS TO INCLUDE A PEDESTRIAN MALL OR PARK LAND WITH AN AVERAGE WIDTH OF 50 FEET BETWEEN GIBBON STREET AND THIRD STREET (THIRD STREET EXTENDED).
 RESIDENTIAL DENSITY WILL BE LIMITED TO NO MORE THAN 40 UNITS PER ACRE EAST OF LEE STREET.
 THE ENTIRE WATERFRONT AREA IS DESIGNATED AS A SPECIAL STUDY AREA FOR THE CONSIDERATION OF IMPROVING PARKS, RECREATION AND PUBLIC ACCESS TO THE WATERFRONT.

LONG RANGE LAND USE PLAN MAP

ALEXANDRIA, VIRGINIA

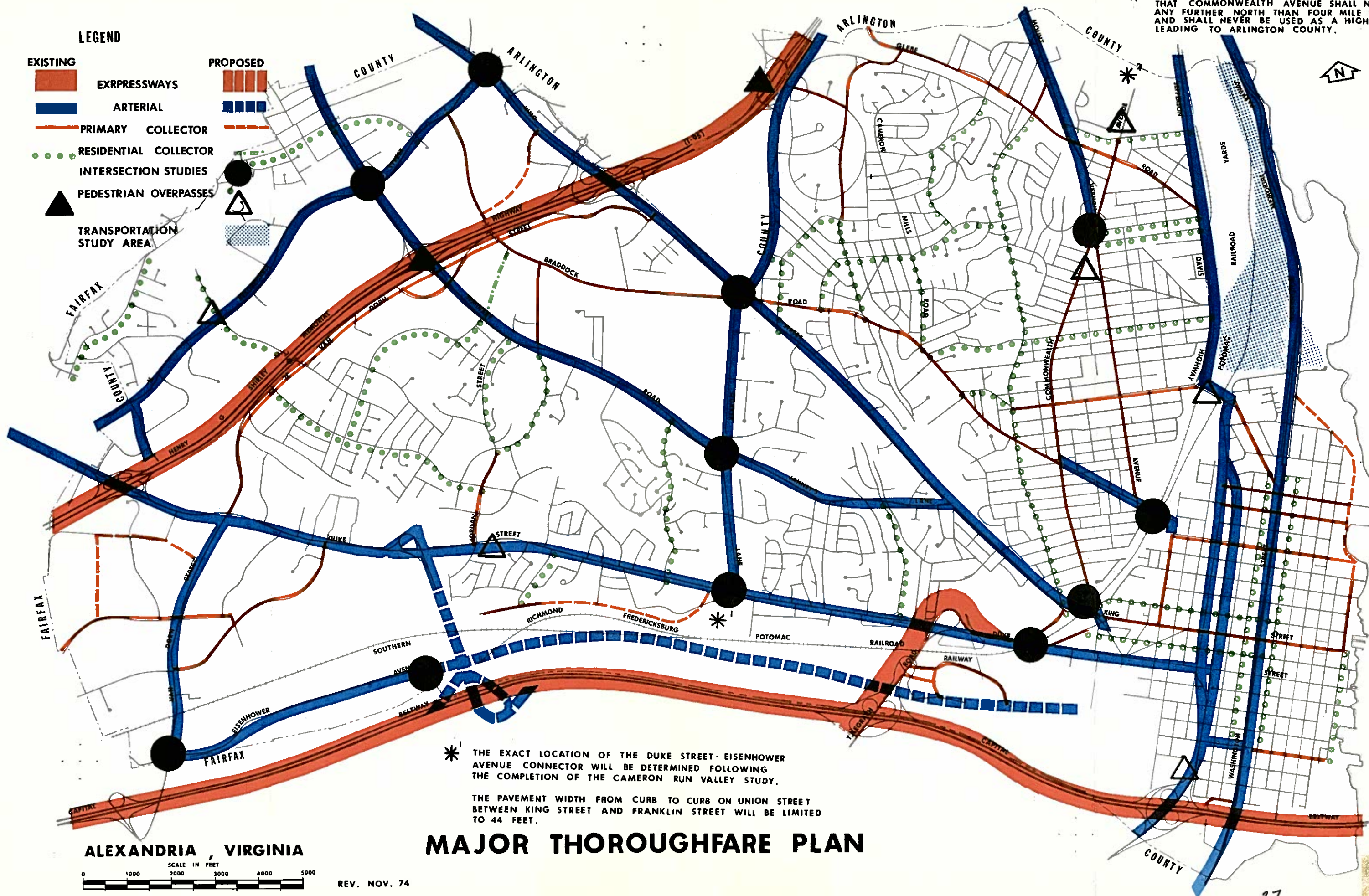


REV. NOV., 74

*² IT IS THE POLICY OF THE CITY OF ALEXANDRIA THAT COMMONWEALTH AVENUE SHALL NOT EXTEND ANY FURTHER NORTH THAN FOUR MILE RUN AND SHALL NEVER BE USED AS A HIGHWAY LEADING TO ARLINGTON COUNTY.

LEGEND

EXISTING	PROPOSED
EXPRESSWAYS	
ARTERIAL	
PRIMARY COLLECTOR	
RESIDENTIAL COLLECTOR	
INTERSECTION STUDIES	
PEDESTRIAN OVERPASSES	TRANSPORTATION STUDY AREA



*¹ THE EXACT LOCATION OF THE DUKE STREET - EISENHOWER AVENUE CONNECTOR WILL BE DETERMINED FOLLOWING THE COMPLETION OF THE CAMERON RUN VALLEY STUDY.

THE PAVEMENT WIDTH FROM CURB TO CURB ON UNION STREET BETWEEN KING STREET AND FRANKLIN STREET WILL BE LIMITED TO 44 FEET.

ALEXANDRIA, VIRGINIA

SCALE IN FEET

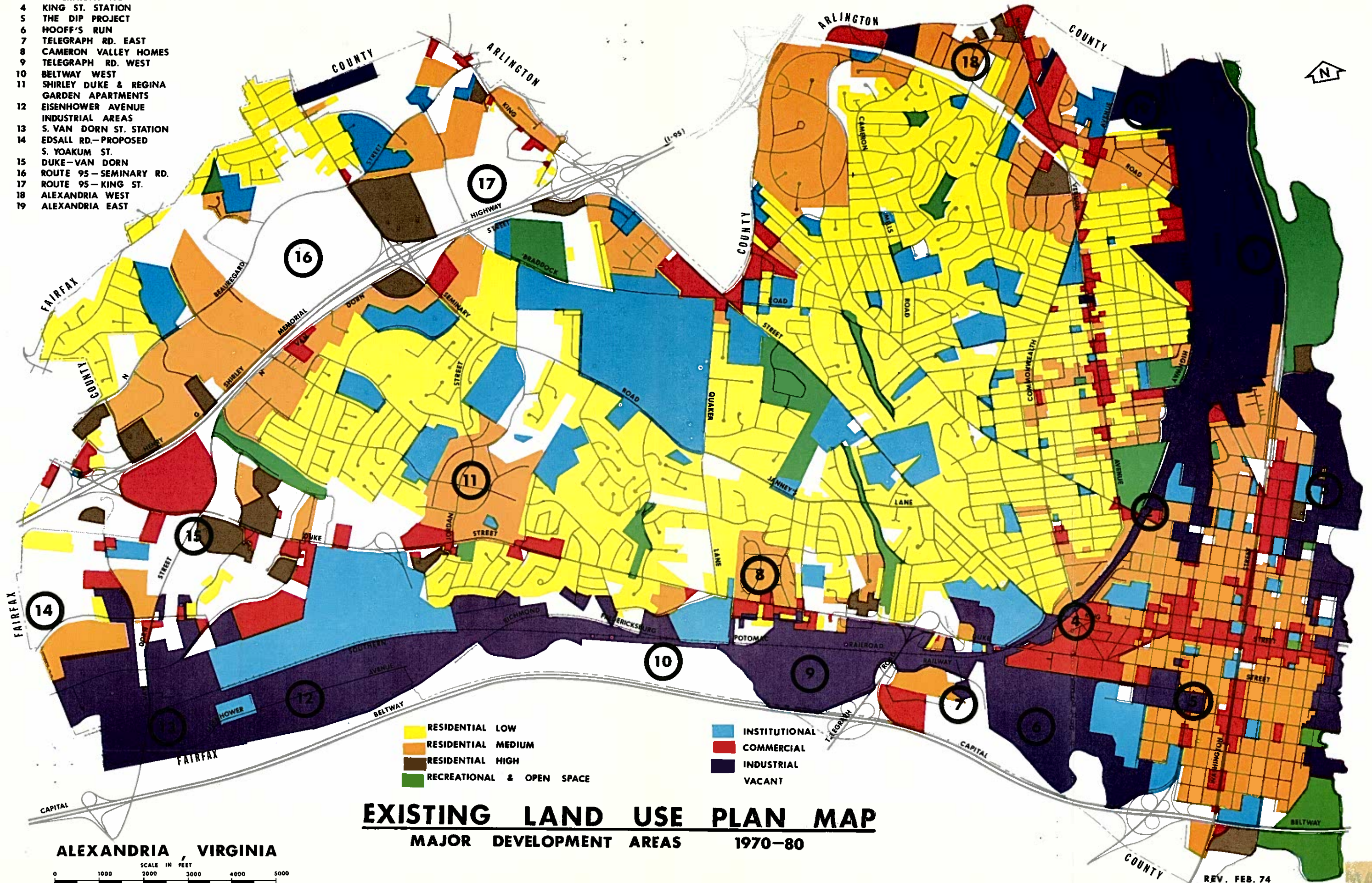
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REV. NOV. 74

MAJOR THOROUGHFARE PLAN



- 1 POTOMAC CENTER
- 2 BRADDOCK ROAD STATION
- 3 WATERFRONT NORTH
- 4 KING ST. STATION
- 5 THE DIP PROJECT
- 6 HOOFF'S RUN
- 7 TELEGRAPH RD. EAST
- 8 CAMERON VALLEY HOMES
- 9 TELEGRAPH RD. WEST
- 10 BELTWAY WEST
- 11 SHIRLEY DUKE & REGINA GARDEN APARTMENTS
- 12 EISENHOWER AVENUE INDUSTRIAL AREAS
- 13 S. VAN DORN ST. STATION
- 14 EDSALL RD.—PROPOSED S. YOAKUM ST.
- 15 DUKE—VAN DORN
- 16 ROUTE 95—SEMINARY RD.
- 17 ROUTE 95—KING ST.
- 18 ALEXANDRIA WEST
- 19 ALEXANDRIA EAST



EXISTING LAND USE PLAN MAP **MAJOR DEVELOPMENT AREAS 1970-80**

ALEXANDRIA, VIRGINIA
 SCALE IN FEET
 0 1000 2000 3000 4000 5000

REV. FEB. 74

application to the development potential areas, represents a major change in thinking about future use of critical areas such as North Waterfront, Cameron Run Valley, and the Metro station impact areas. The mixed use emphasis in future development is intended to encourage walk-to-work patterns, promote balanced use of public utilities, improve the City's tax base, and eliminate overconcentration of types of land uses, thereby promoting vitality and diversity within areas receiving future development.

Although adoption of the new comprehensive plan signified major land use policy changes, Council has not yet implemented many of the new policies. Therefore, in practical terms, the City's land use regulations continue to be dominated in major part by policies which were codified many years ago.

City Services and Environmental Systems: Existing Facilities and Constraints

A description of the existing environmental and City service systems within Alexandria gives further context to the discussion in subsequent chapters of future development and its impacts. Of particular interest is the question of system constraints - whether there are limiting factors which might either (1) require restrictions on the amount, type, or location of development, or, alternatively, (2) necessitate expansion or upgrading of some systems. Knowledge of City systems and constraints is essential to the process of evaluating the desirability of development in the ten growth areas.

A. Utilities

1. Sewage Disposal System: The major components of the Alexandria sewage disposal system are a treatment plant, three major interceptor sewers, and two pumping stations (Map 8). Because of topographic considerations, the City shares facilities to some degree with both Fairfax County and Arlington County. Arlington's treatment plant serves the area north of Seminary Road and west of North Early Street. This plant has 3.5 millions of gallons per day (mgd) of capacity reserved for Alexandria's use. Sewage flow from the rest of the City goes to the Alexandria Sanitation Authority's treatment plant located east of where Hooff's Run passes under the Beltway. Portions of Fairfax County west and south of the City send sewage to this plant, and the County has reserved a part of the expanded capacity (the expansion is now under way.) for its own use. The expanded plant will reserve 22.5 mgd of capacity for the City's use. Table 3 compares current Alexandria sewage flow with the capacities reserved for the City at the two plants. Treatment facilities are now at about half of the expanded total capacity. Each mgd of excess capacity can serve approximately 10,000 additional residents.

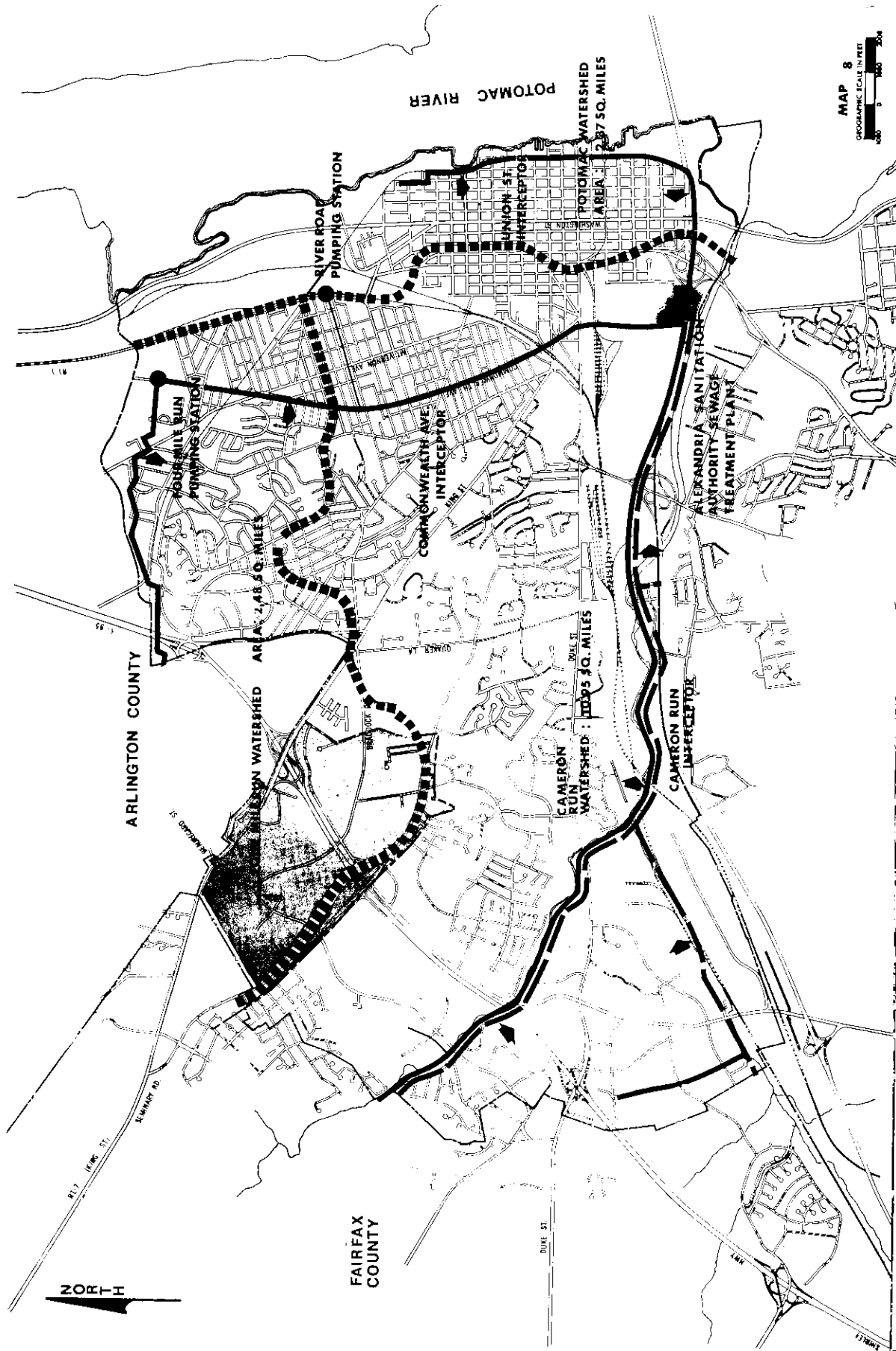


Table 3

City Sewage Treatment System Compared to Present Flow

	Capacity Reserved for City (mgd)	Present Use (mgd)	Present Use as Percent of Capacity
City Treatment Plant	22.5	11.00	49%
Arlington Treatment Plant	3.5	1.75	50%
<u>Total</u>	26.0	12.75	49%

With the exception of two segments, the City's major sewer interceptors are in good condition and have substantial excess capacity. The two exceptions are the Arlandria interceptor, between the City Line and the Four Mile Run Pumping Station, and the portion of the North Waterfront interceptor north of Pendleton Street. The former is over capacity and will be upgraded to a 13.5 mgd capacity. (Part of the work is complete). The North Waterfront line has only 3 mgd capacity above Pendleton Street (14.5 mgd below Pendleton), which is adequate to serve about 10,000 residents (one mgd of trunk line capacity serves one-third as many residents as one mgd of treatment plant capacity). Even in the segment south of Pendleton Street, the original design of the line did not anticipate major intensive developments in both North Waterfront and Potomac Center. Because all sewers in Planning District III were constructed to support RC zoning, there is adequate sewer capacity throughout the western half of the City. The problem of sewage overflow from combined sanitary and storm systems in parts of Planning District I will be resolved by construction of three sewage holding tanks (this project is in the City's capital improvements program).

2. Solid Waste Disposal System: The City currently disposes of solid waste at an incinerator on Eisenhower Avenue near Van Dorn Street; any excess is hauled to the Lorton landfill. The incinerator is now at its capacity of 78,000 tons per year (300 tons/day). A second incinerator capable of handling 52,000 tons per year was closed by City

Council several years ago.

Alexandria participates in the I-95 Lorton landfill in Fairfax County. Other participating area governments are the District of Columbia, Arlington and Fairfax Counties. COG's I-95 Policy Committee provides general direction to the operation of the facility, and the District of Columbia's Department of Environmental Services operates it with environmental monitoring by Fairfax County.

Most of Alexandria's solid waste is incinerated, but the City will haul an estimated 4,000 tons of solid waste to the site in fiscal year 1976, or less than one percent of the total of 495,000 tons of solid waste which will be taken there that year. In addition, the Alexandria Sanitation Authority hauls sludge (estimated 18,000 tons per year in Fiscal '76) to the site. The total estimated tons of waste of all kinds which will be deposited in Fiscal '76 is 578,750.

The life of the landfill is at present projected to be 16.5 years, which means that the site will be filled by the end of 1991. The site's life can be extended by establishment of effective resource recovery, which would diminish the amount of actual waste. A small-scale resource recovery operation is now in the planning stage. Until 1980, the City is expected to continue to rely primarily on incineration; the City's plan is to close the Eisenhower incinerator when an effective resource recovery program can be established.

3. Water Supply System: The City currently obtains its water supply from the Occoquan Creek reservoir in Fairfax County. The present (1975) level of usage by the City as a whole is 17 million gallons per day on an average day, and 25 million gallons per day on a day of maximum demand. The City is now studying the possibility of switching its water supply source from Occoquan to the Corps of Engineers' Dalecarlia treatment facility in northwest D.C., or to the Fairfax County Potomac treatment facility; the City will thereby join D.C., Arlington, and Falls Church on the list of jurisdictions which draw exclusively from the Potomac system. The Potomac now supplies about 75 percent of the Metropolitan area's total water needs, the Occoquan and Patuxent basins providing the other 25 percent. Because these latter two sources of supply cannot be expanded much further, the Metropolitan area

will have to rely on the Potomac to meet most of its future needs.

The fundamental problem of reliance on the Potomac (or on any river) for water supply is the great variation in levels of flow. Although the Potomac's daily flow averages seven billion gallons (through the year), the extremes have ranged from a record high of 200 billion gallons per day in 1972 (during the Hurricane Agnes floods) to a record low of 388 million gallons per day during a short period in the summer of 1966. Unfortunately, periods of lowest flow typically occur during the summer when demand is peaking. The table below (Table 4) compares the record 1966 low flow (which is thought to be a 30-year frequency level of flow) and more typical levels of flow with the summer, 1974, maximum daily demand for water from Dalecarlia.

Table 4

Potomac River, Flow Levels Compared to Demand

	Gallons Per Day
<u>Supply</u>	
Average Daily Flow	7.0 billion
Typical Low Flow	Approx. 1.5 billion
Record Low Flow	.388 billion
<u>Demand</u>	
1971 Max. Day Demand	.402 billion
1974 Max. Day Demand	.439 billion
Alexandria, Max. Day Demand (1975)	.025 billion

The maximum day demand figures in the table of course do not include Alexandria, which would not complete its switch to reliance on the Potomac for at least five years. It is apparent, however, that if the 1966 low flow were to recur today, the total demand (including that of Alexandria, which would make up 5% of total demand) would exceed supply by about 76 million gallons per day, or about 20 percent. If such a condition were to occur, the metropolitan area would experience an immediate shortage, because there are no major reservoirs in which water is stored for use in dry periods.

The limited available storage will meet only about one day's demand. Although the upper estuary of the Potomac is, in effect, a natural reservoir of fresh water, poor water quality resulting from lack of adequate wastewater treatment facilities, from overflows of raw sewage (especially from D.C. and Alexandria), and from runoff from developed areas have rendered this water undrinkable without substantial treatment. It is apparent that the regional water supply problem is one of the most important facing the metropolitan area.

4. Electricity Supply System: The City of Alexandria falls within the service area of Virginia Electric Power Company (VEPCO), which serves all of Northern Virginia. Vepco has eight power generation plants, and the fuels or power sources used to generate electricity are as follows: hydro-power, 10 percent; oil, 30 percent; coal, 30 percent; and nuclear, 30 percent. By 1976 Vepco intends that approximately 40-50 percent of its power will be derived from nuclear plants at Surry and North Anna. Because the Vepco system is totally interconnected by transmission lines, the power which Alexandria and other major northern Virginia jurisdictions use may come from any of the generating plants.

Vepco's total generating capability (as of the summer of 1974) was 811 MW (million watts). It is the utility's general policy to have a system reserve of 15 percent over predicted summer peak demand; the average annual load growth rate has been 10 percent over the last 15 years (annual rate has dropped to 7 percent in the past 16 months). Within the City of Alexandria, Vepco's facilities include a substation at Jefferson Street (near Lee School) and transmission lines which parallel the RF&P yards on the west side. Substations are necessary to take the electricity from large transmission lines and allocate it to the smaller distribution lines which serve various neighborhoods of the City.

B. City Services

1. Parks and Recreation System: The City currently provides about 450 acres of usable outdoor recreation land in 40 parks and 21 school grounds (Map 9 - the acreage excludes areas occupied by buildings and other land not available for recreation use). Of the 40 parks, six consist

entirely of, or contain, natural areas (e.g., Rolf's Tract, Fort Williams Park); eleven of the parks are mini-parks or tot lots (e.g., Armory tot lot); and five are for strictly passive use (e.g., Mt. Ida Greenway, Interior Park). In addition to these City-owned park resources, there are other public or semi-public open spaces or facilities which are available to meet residents' recreation needs. These other facilities include the grounds of Northern Virginia Community College and federally-owned properties at Dain-gerfield Island and Jones Point.

The existing recreation acreage (including school grounds but excluding the federal properties) equals about four acres for every 1,000 residents (City-wide average); different areas of the City have varying amounts of public open space, with the southwest quadrant and portions of Planning District II being relatively the worst off. The table below (Table 5) compares the City's current recreation acreage to 1,000 residents ratio to levels of open space recommended by various other jurisdictions and by a national recreation planning organization.

Table 5

Level of Provision of Public Open Space in
Alexandria Compared to Selected Standards

	Acres Per 1,000 Residents
Existing City of Alexandria (parks and school grounds)	4.0*
Recommended by the National Recreation and Parks Association for Neighborhood and Community Parks, Excluding School Grounds	5.0
Recommended by NRPA for Neighborhood, Community and Large Urban Parks, Excluding School Grounds	10.0
Adopted Standard of Dade County, Fla.	4.5
Adopted Standard of Oklahoma City, Okla.	10.0
Future Alexandria (200,000 population, no additional acquisitions)	2.3

*Includes some land bought to serve future needs.

The City's existing recreation system is inadequate in terms of both acreage and facilities provided. In particular, Alexandria falls well short of recommended levels of provision for tennis courts, swimming pools, and playing fields.

2. Schools: The City's school system includes thirteen elementary schools (grades K-6), three schools for 7 - 8th grade students, two for 9 - 10th grade students, and one for 11 - 12th grade students (See Map 9). Most of the schools were built in the 1960's or before, although one of the elementary schools (John Tyler) was not opened until 1971. Most of the planning of school facilities was based on population and school membership trends which have changed substantially; as a result, most of the schools in the system have unused capacity (See Figure 5). The table below (Table 6) indicates the relationship between membership (as of June, 1975), gross capacity, and optimum utilization capacity of the four levels of City schools.

Table 6

City Schools Compared to Capacities

	1975 Membership	Gross Capacity	Optimum Util. Capacity
K-6 grades	7743	10,380	8500
7-8 grades	2095	3510	2987
9-10 grades	1900	3222	2909
11-12 grades	1684	2131	1965
<u>Total</u>	13422	19243	16361

"Gross Capacity" is defined as the number of students a school can serve (at 25 students per room) and assumes that the rooms are not used for special purposes. "Optimum utilization capacity" refers to the capacity of the school buildings (again at 25 students per room) if separate rooms are provided for the use of existing special programs.

The most recent membership figures indicate that the system as a whole is at 81 percent of optimum use capacity - 91 percent in the case of elementary schools; 70 percent for middle schools, 73 percent for secondary schools. Factors

causing the decline in school membership, and resultant excess capacity are (1) the decline in resident births, (2) the emigration of young families before children reach school age, and (3) the predominance of high-rise apartments (typically occupied by families with few school children) in recent construction in the City. Because of these trends and the obsolescence of some facilities, the City is now considering closing several elementary schools and consolidating the two 9 - 10th grade schools into one new facility. The City is also using the declining enrollment as an opportunity to improve existing facilities (e.g., the swimming pool at T.C. Williams) and to improve special programs (e.g., vocational education).

3. Public Safety Facilities: There are now seven fire stations in the City - three in Planning District I, three in Planning District II, and one in Planning District III. Because of the rapid recent growth in the western part of the City, the City will soon build an additional station in the Landmark area, on North Paxton Street. The City until recently had planned a second new station for the area west of Shirley Highway, but has dropped this proposal from the 1975-76 Capital Improvements Program as a result of a co-operative fire-fighting agreement with Fairfax County.

The City's Police Department's headquarters are at 400 North Pitt Street; there are no present plans to build a sub-station in the western part of the City.

4. Health Facilities: Private and public health facilities in the City include three hospitals, a community health center, a state mental health center, and the City's own Health Department. Alexandria Hospital is a non-profit hospital which has recently moved all of its facilities to 4320 Seminary Road (formerly part of the facility was located at 709 Duke Street). Circle Terrace Hospital at 904 Circle Terrace Drive and Jefferson Memorial Hospital at 4600 King Street are private institutions. The Community Health Center at 208 South Columbus is currently operated and owned by the city. It will be closed after the completion of the expansion of clinic facilities at Health Department headquarters and construction of a new City Health Clinic at the Seminary Hospital site. The City's Health Department conducts housing inspections; operates a number of clinics; monitors air pollution; enforces the air pollution

code in the City; and inspects food establishments, swimming pools, nursing homes, schools, barber and beauty shops, grocery stores, and massage parlors.

C. Environmental Conditions and Influences

1. Geology, Topography, and Soils: The City lies entirely within the Coastal Plain geologic zone, a broad belt of flay-lying sediments over deep bedrock. West of the City, this zone abuts the Piedmont Province zone, an upland area of very old crystalline rocks at the edge of which has formed a "fall line" as a result of the greater erodibility of Coastal Plain rocks (resulting in waterfalls or rapids on rivers and streams). East of the fall line, the Piedmont Province bedrock dips toward the southeast and is overlaid by sediments (some solidified as sedimentary rocks and some unconsolidated recent alluvium) of progressively more recent geologic times. In the City, surface materials are predominantly unconsolidated recent alluvium (Planning District I and the Cameron Run Valley) or Pleistocene terrace deposits (most of the remainder of the City).

The City's topography and soils reflect the geologic conditions. The relatively flat eastern third of the City and the Cameron Valley (elevations generally below 50 feet) occur on recent alluvium. The rest of the City consists of stream terrace slopes and terrace ridges which are defined by the location of small streams, tributaries to Holmes Run, Cameron Run, and Four Mile Run. Elevations in these areas range from about 100 feet to a high point of 280 feet msl. Steep slopes of 15 percent or more occur where terrace surfaces abut major stream floodplains (e.g., along the edges of the Cameron Run Valley) and where small tributaries to the major streams (e.g., Lucky Run) have eroded terrace materials.

A detailed soil survey for the City is not available. All of the coastal plain soils consist of interbedded clays, silts, sands, and gravel of marine or fluvial origin. The most significant soil which occurs in the City is the marine clay, which is particularly susceptible to erosion and slippage when exposed. The marine clays have been mapped in Fairfax County and it may be inferred that they occur in the City in similar circumstances - i.e., on the side slopes of river terraces adjacent to the valleys of Cameron Run and

its tributaries. Unfortunately, the exact extent of these soils cannot be determined without a soil survey of the City.

2. Flood Plains: Flood plains in the City occur along the Potomac River, the two major tributaries of the River which pass through the City (Cameron and Four Mile Runs), and some of the tributaries of these two streams. A City ordinance defines these flood plains in terms of three categories, reflecting degree of susceptibility to flooding. "Flood flow areas" include the stream channel and adjacent land normally affected by higher than usual water levels. No building or filling is allowed in these areas. "Moderate flood flow areas" are those areas beyond the flood flow area which can be expected to flood relatively frequently; building or filling is also greatly restricted in these areas. The third category, "restricted areas" generally coincide with the 100-year frequency flood; no filling is allowed in restricted areas, and no structure may be constructed unless its floor is above the specified building flood elevations shown on the City's flood plain map. Flood plains affecting one or more of the potential growth areas are the South Lucky Run District (Stone Tract), the Potomac River District (North Waterfront and Potomac Center), the Cameron Run District (Shirley-Duke/Regina), and the Four Mile Run District (Arlandria East and West).

The channel improvement of Four Mile Run (a joint effort by the City, Arlington County, and the federal government) will substantially reduce flooding problems along that stream. In the middle 1960's, the Corps of Engineers began a study of the feasibility of channel improvements to reduce flooding along Holmes, Back Lick, and Cameron Runs, and submitted a draft report on proposed improvements in 1971. However, changed circumstances since 1971 caused the Corps to decide to review the project. In the interim, the City decided to proceed independently with the project. Improvements installed in conjunction with the Stone Tract's development will eliminate the South Lucky Run flood district.

3. Air Quality: The City's Health Department monitors air quality at its offices on North St. Asaph and at six other locations in the City. Through use of a mobile laboratory, regular inspection of direct sources, and use of estimating techniques, the Department has identified the types, amounts, and sources of air pollution emitted annually

in the City. Table 7 (below) shows how the total weight of pollutants emitted in 1974 (55,412 tons) breaks down by type of pollutant and by source.

Table 7

City of Alexandria, Air Pollution

Major Pollutants	% of Total	Source of Pollution	% of Total
Carbon Monoxide	36.1	Power Plant	45.7
Sulfur Dioxide	29.5	(Pepco)	
Nitrogen Dioxide	22.5	Transportation	38.9
Hydrocarbons	6.2	Heating	6.1
Particulates	5.7	Off-Highway Fuel	
		Use	4.2
		Incineration	2.7
		Other	2.4

The Pepco plant is the major source of particulates (79.1%), sulfur dioxide (87.4%), and nitrogen oxides (64.0%). Transportation (primarily automobile) is the major source of carbon monoxide (82.0%) and hydrocarbons (69.4%). Based on known and estimated traffic volumes on City streets and arterials, the Health Department has mapped the origins of CO pollution in the City (Map 10). The Pepco plant is currently under EPA order to be in compliance with particulates standards by December 31, 1978. It is not in violation for other pollutant emissions standards.

Carbon monoxide is one of the most serious air pollutants; of the major pollutants, it is the one which will be increased most by development at the growth areas. During 1972, 1973, and 1974, one-hour CO concentrations reached annual peaks of 20, 18, and 21 ppm, respectively, at the Health Department monitoring station. These levels are well below the national one-hour primary standard of 35 ppm (the one-hour average concentration which should not occur more than once in a year). However, momentary roadside CO levels of more than 35 ppm have been recorded by the mobile van at certain congested intersections, and it is possible that the one-hour average exceeds the standard in some situations. CO concentrations seem to be declining overall. Maximum annual eight-hour CO concentrations have shown a slight



CITY OF ALEXANDRIA

DAILY CARBON MONOXIDE EMISSIONS (1974)

LEGEND

- 0-1,000 LBS./DAY
- 1,001-2,500 LBS./DAY
- 2,501-4,000 LBS./DAY
- 4,001 or more LBS./DAY

SOURCE: ALEXANDRIA HEALTH DEPARTMENT

decline over the past two years.

Any improvement in the smog-producing photochemical oxidants (which are the result of automotive emissions and photosynthesis) in Alexandria primarily depends on federal, state and regional programs designed to reduce automotive emissions. The principal tools available to reduce automotive emissions are improved public transportation, car pooling, emission control devices on cars, smaller cars and engines, higher gasoline costs to reduce vehicle miles traveled, and an effective vehicle maintenance-inspection program. Until a comprehensive program encompassing these tools is implemented, the Washington Metropolitan Area continue to experience transportation-induced smog episodes during periods of air stagnation.

Table 8 (below) summarizes the national primary and secondary air quality standards for various pollutants. The final column shows the maximum pollution levels measured at the Health Department in 1974.

Table 8

Air Quality Standards in Relation to 1974
Maximum Concentrations
Recorded at City Health Department

Pollu- tant	Type of Standard	Averaging Time	Frequency Standard	Concen- tration	1974 Alex. Max.
CO	Primary & Secondary	1 hr.	Ann. Max. ¹	35 ppm	21 ppm
		8 hr.	Ann. Max.	9 ppm	11 ppm
SO ₂	Primary	24 hr.	Ann. Max.	.14 ppm	.059 ppm
		1 yr.	Arith. Mean	.03 ppm	.022 ppm
	Secondary	3 hr.	Ann. Max.	.5 ppm	--
		24 hr.	Ann. Max.	.1 ppm	.059 ppm
		1 yr.	Arith. Mean	.02 ppm	.022 ppm
NO ₂	Primary & Secondary	1 yr.	Arith. Mean	.5 ppm	.035 ppm
HC	Primary & Secondary	3 hr.	Ann. Max.	.24 ppm	N.A.
Par- ticulates	Primary	24 hr.	Ann. Max.	260 ug/m	183 ug/m
		24 hr.	Ann. Geom. Mean	75 ug/m	69 ug/m
	Secondary	24 hr.	Ann. Max.	150 ug/m	183 ug/m
		24 hr.	Ann. Geom. Mean	60 ug/m	69 ug/m

¹ Not to be exceeded more than once per year.

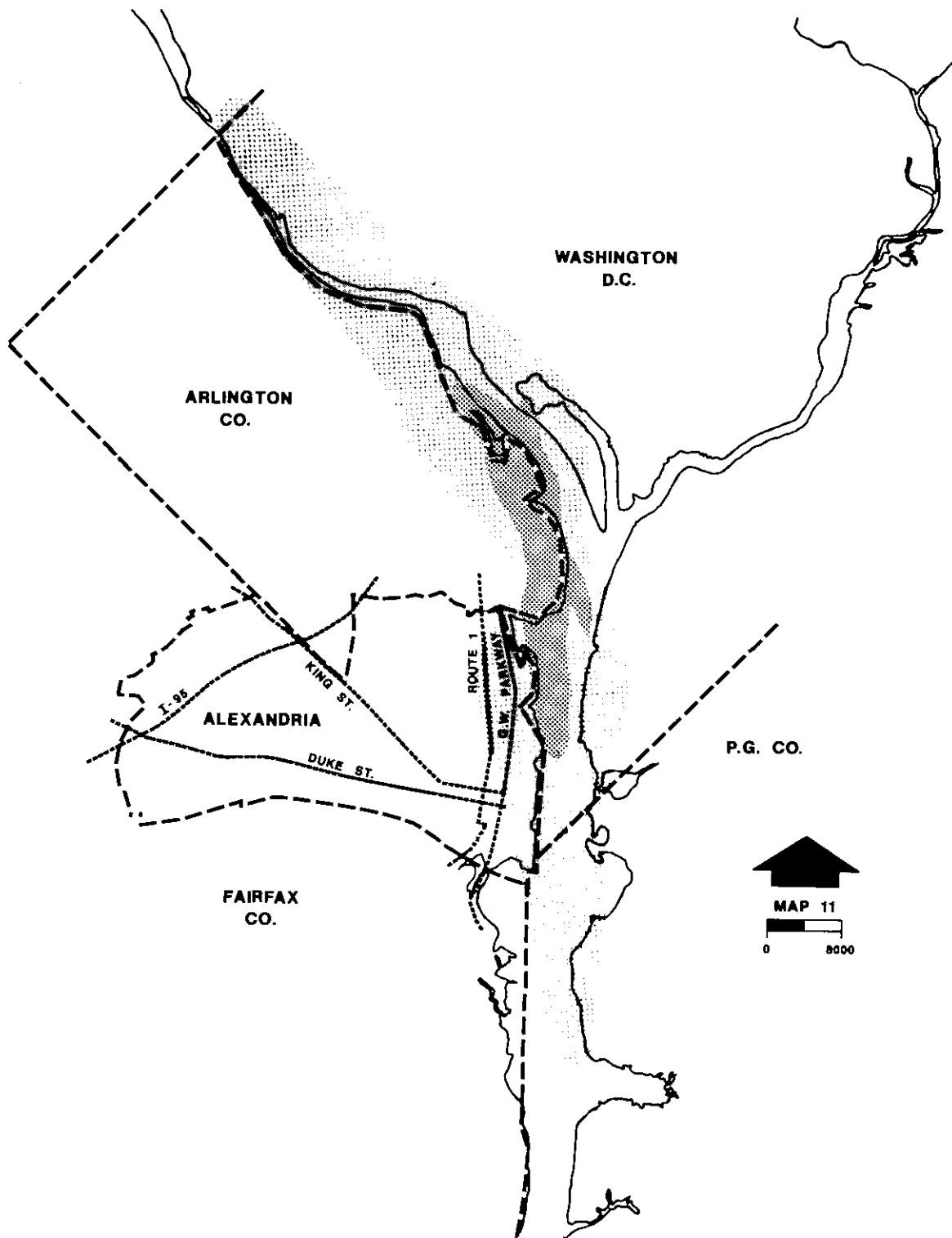
4. Noise Levels: The major sources of noise in the City are: the southern approach zone of Washington National Airport, and the arteries which carry major traffic volumes. Composite noise factors (called Noise Exposure Forecast or NEF levels) have been developed to show noise levels emanating from the Airport's approach zone (Map 11). Areas within the NEF-40 contour experience aircraft noise levels which make most types of intensive land use undesirable. Areas between the NEF-40 and NEF-30 contours (including most of the northern part of Planning District I) experience noise levels which require special noise insulation construction. The federal government places restrictions on the construction of federally assisted housing within the NEF-30 contour and prohibits housing assistance in the NEF-40 and above zones.

Noise from arteries depends on such factors as traffic volumes and speed, road grade, and the proportion of trucks in the traffic. Estimates of road noise have not been prepared for most areas of the City. However, the Virginia Department of Highways has prepared an estimate of noise levels for the portion of Route 1 north of Reed Avenue, and has compared the estimated levels to Federal Highway Administration standards, which vary according to the land use along an artery (residential uses can tolerate less noise). This comparison of noise levels with standards indicated that residential development should be removed at least 500 feet from this segment of Route 1, and that non-residential developments should be at least 300 feet away. This study suggests that there are probably many areas of the City where FHWA noise standards are exceeded.



A third major source of noise in the City is the RF&P yards and rail line. Noise from this source is not as serious as that from the other two sources. In the future, Metro may be an added major noise source.

D. Transportation Systems and Conditions

1. Mass Transit: Several years ago, WMATA acquired the AB&W bus company, a private bus company which served Alexandria and other parts of Northern Virginia (in addition to private transit companies in D.C. and Maryland). The Metro bus system now serves the entire metropolitan area. Proportions of Alexandria residents who ride buses to work vary by



LEGEND:

-  40 + N.E.F.
 30-40 N.E.F.

CITY OF ALEXANDRIA

**WASHINGTON NATIONAL AIRPORT
1972 NOISE EXPOSURE FORECAST (N.E.F.)**

SOURCE: U.S. DEPARTMENT OF TRANSPORTATION

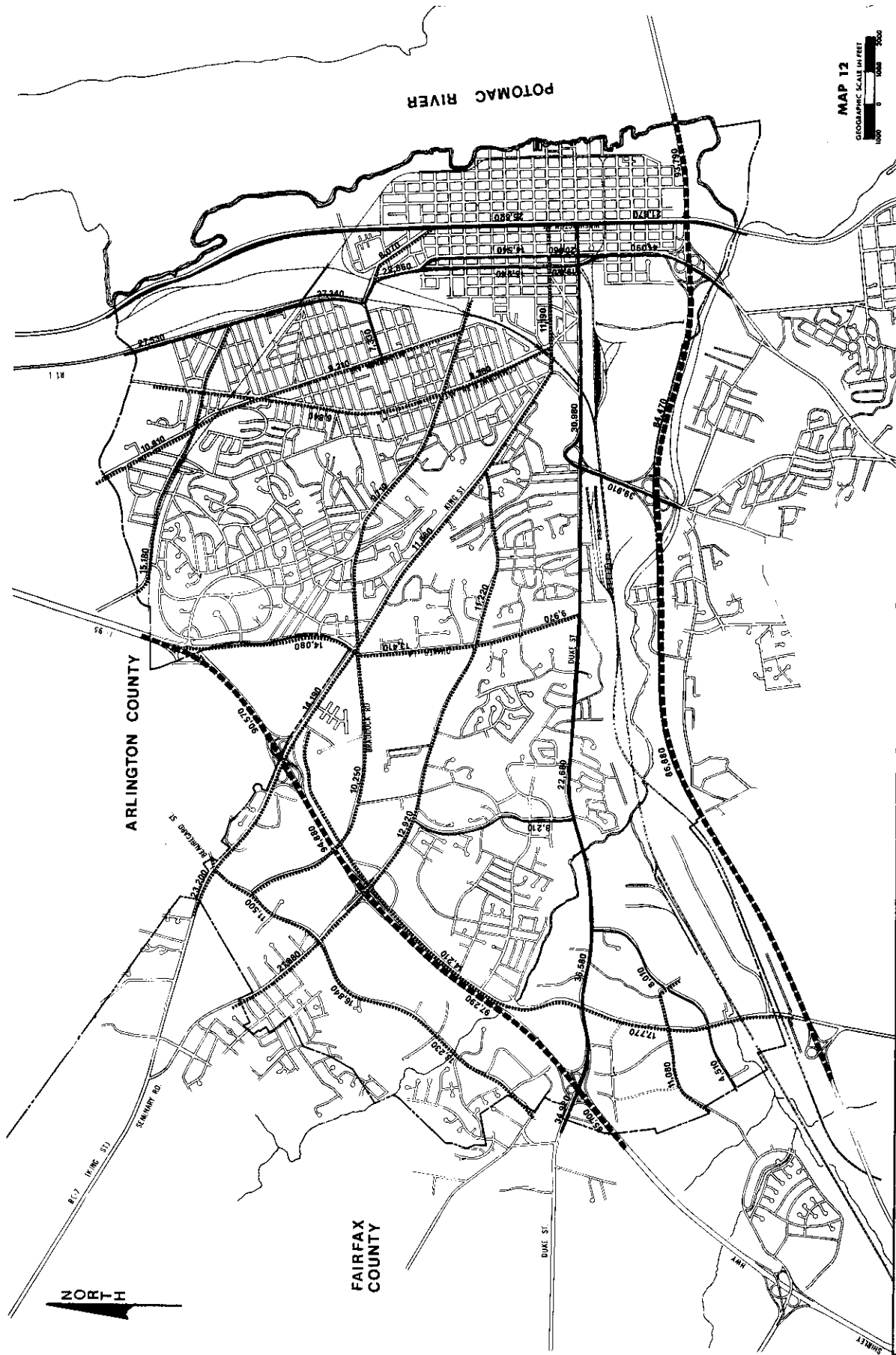
neighborhood from about 5% in most of the west end of the City to as much as 32% in Census Tracts 16 and 18 of Planning District I. A major disadvantage of bus service is that it must move in congested automobile traffic. To deal with this problem, a special bus lane has been constructed on Shirley Highway, on which express busses run during peak hours. This program has increased bus ridership along the Shirley Highway Corridor considerably.

A regional rapid rail transit system is now under construction in the metropolitan area. It will enter Alexandria at the northeast corner between G.W. Parkway and the RF&P line and will parallel the east edge of the rail line into the Cameron Valley before forking; one branch will extend for a short distance to the south into Fairfax County; the other branch will run the length of Cameron Valley. Stations are planned at Braddock Road, King Street, and at the eastern and western ends of the Cameron Run Valley. Estimated completion date for the north-south segment is 1980; for the east-west segment, 1981. After the system is completed, bus service will be modified so that it acts principally as a feeder to the Metro stations.

2. Road System and Traffic Conditions: Alexandria suffers considerable through traffic, principally residents of Fairfax County who drive into employment centers in Arlington and D.C. Because of this, and because of internally generated traffic, Alexandria's arteries carry heavy volumes (Map 12) and in some instances, congestion becomes severe (See traffic section of Chapter XIV). It has become City policy to accommodate internally generated traffic in preference to through traffic. The City's major thoroughfare map (See Map 6) shows much of the City's adopted transportation policy in that it designates street and road classifications indicating the roles expected of various portions of the road system. The overview chapter contains a thorough discussion of existing traffic conditions on road segments which will be affected by developments at the growth areas.

E. Summary of System Constraints

Table 9 summarizes the constraining aspect of the various systems and services which have been described above. The constraints may limit development at one or more of the potential growth areas. Some of the 'systems' constraints are



CITY OF ALEXANDRIA

1974 AVERAGE DAILY TRAFFIC VOLUMES

TOTAL, BOTH DIRECTIONS

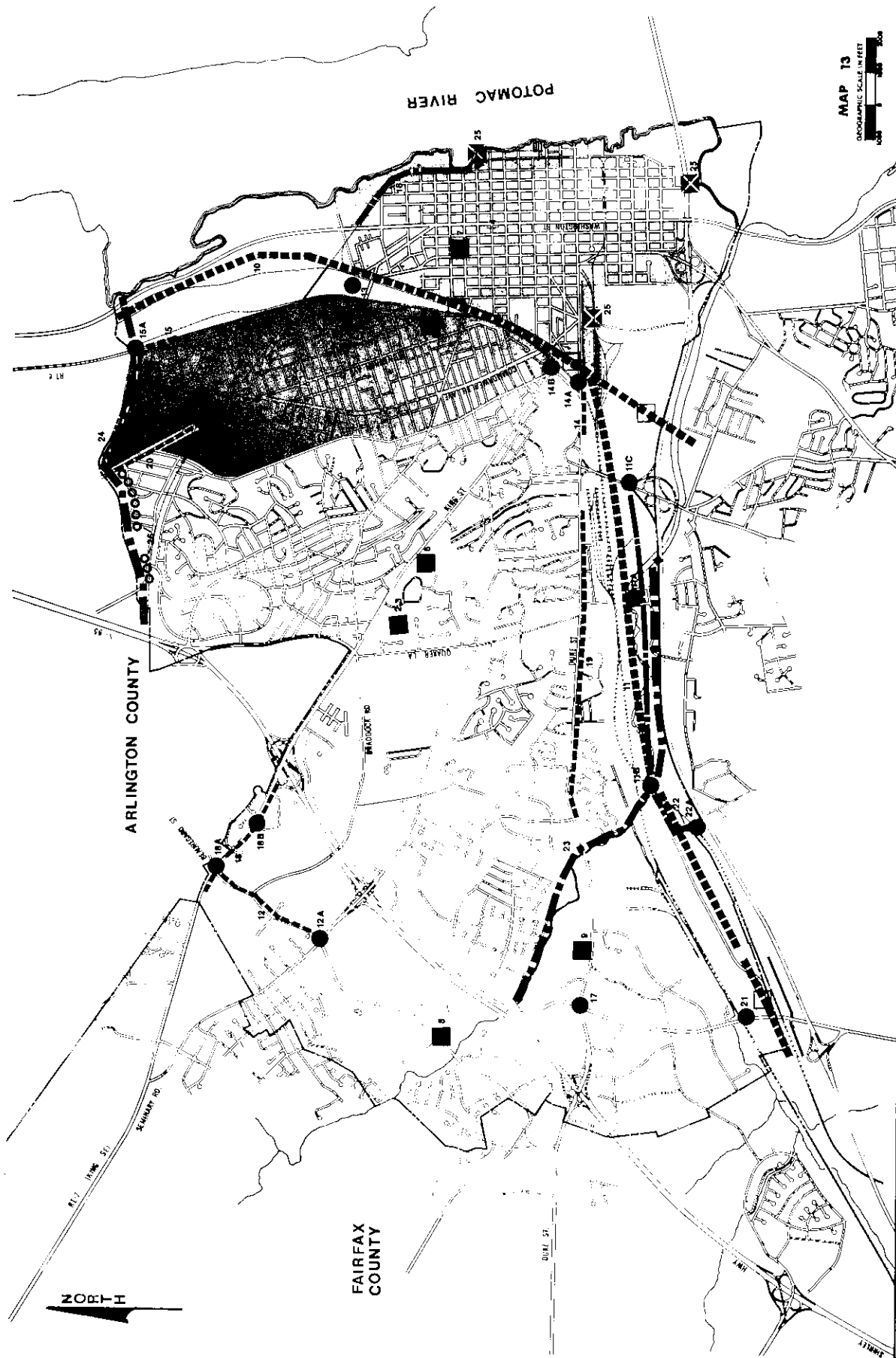
- LEGEND**
- 0-9,000
 - - - 9,001-20,000
 - === 20,001-50,000
 - === 50,001 +

SOURCE: V.O.H., CITY OF ALEX. 1974. 24-H. TRAFFIC VOLUMES

Table 9
Constraints Summary

Existing System or Service	Constraint	Magnitude of Constraint
<u>Utilities</u>		
Sewage Treatment	Plant capacity	Being expanded to 26 mgd.
Sewer Lines	Arlandria, N. Waterfront interceptors are weak links.	N. Waterfront: 3 mgd. above Pendleton, Arlandria: being upgraded to 13.5 mgd.
Solid Waste	(1) Incinerator capacity, (2) Land fill life	(1) 78,000 tons/year (2) 16.5 years
Water	Potomac River record low flow	388,000,000 mgd. (regional issue)
Electricity	VEPCO generation and transmission capabilities Fuel availability (oil, coal, nuclear)	811 MW for total system (1974) (assumes available fuel) Can't be predicted.
<u>City Services</u>		
Parks & Recreation	Affordable vacant land	1200 acres total vacant. Amount of affordable vacant land not known
School System	Total capacity for optimum utilization of school structures	16,351 students in all grades (K-12)
Public Safety	Population which can be served well by existing staffing	N.A.
Health Facilities	Excess capacity of existing hospitals, clinics, programs	Not known
<u>Environmental Conditions and Influences</u>		
Geology & Topography	Steep slopes	More than 15%
Soils	Presence of marine clays	In restricted areas on valley side slopes
Flood Plains	Designated flood flow, moderate flood flow, and restricted areas	Depends on category
Air Quality	National standards for various pollutants	See Table 8.
Noise	Federal Standards	Varies with land use.
<u>Transportation Systems and Conditions</u>		
Mass Transit	Bus system: (1) number of buses available at peak period, (2) capacity of each bus, and (3) availability of off-peak storage area for buses	(1) None available, (2) 50 persons (3) A new garage is being considered for Northern Virginia
Traffic Arteries	Excess capacities of arteries served by growth areas	Levels of Service E or F

subject to remedial action, but the City has little control over others. Map 13 and Table 10 show planned capital improvements which will affect the capacities of various systems in the City; most of these improvements have been mentioned in the preceding discussion.



CITY OF ALEXANDRIA

MAJOR CAPITAL IMPROVEMENTS. 1975/1980

Table 10
Major Capital Improvements, 1975-1980¹

Map Code No.	Project Description
1.	Continuing renovations of George Washington High School
2.	Indoor swimming pool facility and various athletic fields and outdoor courts at T.C. Williams High School
3.	Complete Vocational Education Center at T.C. Williams School site
4,5.	Potomac East/Potomac West neighborhood improvement programs
6.	Development of Chinquapin/Forest Park
7.	Development of a recreation center on the Charles Houston School site
8.	Construction of Fire Station #9 in the vicinity of Beauregard-Sanger intersection
9.	Construction of Fire Station #8 in the vicinity of N. Paxton-Duke intersection
10.	Metro construction
11.	Extension of Eisenhower from Van Dorn to Telegraph Rd., including 11(a) Quaker Lane connector to Duke St., 11(b) bridge over Cameron Run, 11(c) bridge over Telegraph Road
12.	Widen Beauregard between Seminary and King, including 12(a) grade separation interchange at Beauregard and Seminary
13.	Engineering, plans, and site purchase for a new bridge over Potomac Yards
14.	Improvement of Duke St. between Roberts Lane and Diagonal Road, including 14(a) a new bridge over RF&P Railroad and 14(b) improvements to intersection of King St., Callahan Drive, and Russell Road
15.	Improvement of Rt. 1 from Reed Avenue to the Arlington County line, including 15(a) a new Rt. 1 bridge over Four Mile Run
16.	Extension of Union Street to George Washington Parkway
17.	Construction of a two-quadrant grade separation at Van Dorn and Duke
18.	Widen Rt. 7 (King St.) to six lanes between 30th St. and the west City limits including 18(a) a diamond-type grade separation at the Rt. 7 - Beauregard intersection, 18(b) North Hampton Street Flyover
19.	Improve Duke Street between Longview and Jordan
20.	Widen Mt. Vernon Ave. from Glebe Rd. to Four Mile Run
21.	Grade separation, South Van Dorn Street and Southern Railway
22.	Connection of Clermont Ave. to Rt. 495, including 22(a) a four-lane railroad underpass
23.	Holmes Run - Cameron Run channel improvements
24.	Four Mile Run channel improvements
25.	Construction of sewage holding tanks (three locations)
26.	New sewer interceptor along Four Mile Run

¹ Includes only specific major items scheduled for work in the 1975-80 period in the City's approved 1974-75 budget document.

METHODOLOGY

To evaluate the impact of growth at the ten growth areas under study, the Committee was charged by City Council to 1) estimate the likely development and the maximum level of development permitted under the existing zoning code, and 2) assess their impact on the City. Discussion of the means of estimating the maximum level of development permitted by Alexandria's zoning ordinance is reserved for the chapter which deals exclusively with that subject. (The maximum possible development chapter appears at the end of the individual growth area chapters). This chapter discusses the methods used to estimate the likely development and to derive the impact coefficients necessary to estimate the social, environmental, transportation, and fiscal impacts of growth. Coefficients have been developed for seven major land use categories: 1) single family dwelling units (includes single family detached houses, townhouses, and duplexes), 2) garden apartments, 3) elevator apartments, 4) retail, 5) office, 6) hotel/motel and 7) industrial (includes warehouses and wholesale as well as heavy industrial uses.) Thus, all new development is described in terms of units (residential, hotel/motel) or 1000 square feet of gross floor area (office, retail, industrial) of these seven land use categories.

In addition to thirteen factors for which coefficients have been derived, there are numerous other impacts which have not been quantified because either 1) the nature of the impact makes it unquantifiable (e.g., aesthetic impact of high-rise developments on existing neighborhoods), or 2) the impact could not be quantified absent specific information about the design of likely developments (e.g., effect on existing vegetation or on run-off), or 3) the impact could in theory be quantified but to do so was beyond the scope of the Committee's capability (e.g., effect on health conditions in the City).

Methodology for Estimation of Likely Development

"Likely development" is defined as the amount of development which the Committee estimates might be built in the ten growth areas over the next 20 years. Although the likely

development estimates represent the Committee's best guess concerning the amount of development which can reasonably be expected in the ten growth areas over the next 20 years, it must be emphasized that the estimates are speculative in nature and are therefore subject to error. Likely development should not be interpreted as the Committee's recommended level of development. In some areas the Committee has recommended that development be limited to less than what is "likely"; in other areas, the Committee believes that the "likely" development is particularly desirable and should be encouraged. These types of recommendations, discussed subsequently in the individual area chapters and in the overall conclusions and recommendations of the Overview Chapter, are the major product of the Committee's work. They are based on analysis of the impacts of the likely development considered in conjunction with development goals agreed upon by the Committee for individual areas and for the City as a whole. Therefore, identification of likely development levels has played an important role in the Committee's work.

To estimate likely development, the Committee attempted to identify the land parcels in each area with development or redevelopment potential. The mix and intensity of future development was estimated after consideration of factors such as existing zoning, owner intentions, market support, land values, parcel configurations and physical characteristics, and present City policies. Because conditions within the ten areas are diverse, one overall, consistent rationale to estimate likely development in all ten areas cannot be utilized. Details of the assumptions used to estimate likely development are found in the individual growth area chapters and in the appendix. Below is a listing of the estimation technique used for three broad categories of growth areas.

Category 1: Includes the four areas where likely development is expected to be governed primarily by existing zoning regulations - the Winkler Tract, the Stone Tract, Arlandria West, and Dip Commercial.

Category 2: Includes the three areas in which much or all of the development is expected to take place under CO rezonings - Potomac Center, North Waterfront, Arlandria East. Portions of each of these areas are designated for "mixed use" development in the City's Comprehensive Plan. Any development which occurs in the Shirley-Duke area is also likely to

involve rezoning, though not necessarily to CO.

Category 3: Includes the two Metro Station impact areas - King Street Station and Braddock Road Station. Expected development in these areas is based on Gladstone Associates' estimate of the maximum amount of development which the Metro impact areas can expect to capture with encouragement of redevelopment by the City government.

Impact Analysis Methodology

Relationships between the seven land use categories employed for describing new development and their social, environmental, and transportation impacts have been established for the following thirteen categories of impacts:

A. Demographic and Social Impacts

1. Population
2. Employment
3. Schools
4. Parks and Recreation

B. Environmental Impacts

1. Sewage
2. Water
3. Solid Waste
4. Electricity
5. Air Quality

C. Transportation Impacts

1. Automobile Trips
2. Transit Trips
3. Pedestrian Trips
4. Parking Required by Zoning Ordinance

Implicit in this methodology is the assumption that a set of constant coefficients can approximate the average impact of a unit of a given land use category. With considerably more time and research, additional variables could have been introduced to improve the technique's capability of estimating the impact of development. For example, 2.5 persons

per single family dwelling unit is the coefficient used to estimate the population impact of a new single family dwelling unit. Actually, the average household size (i.e., the average number of persons living in an occupied dwelling unit) varies with the number of rooms in the dwelling unit, the location of the unit, the cost of the unit, and the dwelling unit type (i.e., townhouse or detached). Limitations of time and of readily available data necessitated a compromise between the desire for refinement of coefficients and the need to complete the report. Thus each coefficient is a generalization of reality which approximates average conditions. Table 11 summarizes impact coefficients for the seven land use categories.

The succeeding section reviews the assumptions and rationale associated with each of the thirteen quantified impact areas. It should be again mentioned that many other ramifications of new development are addressed in a discussion format rather than through this impact coefficient technique.

A. Demographic and Social Impacts

1. Population: Average household size per housing unit type (single family, garden apartment or elevator apartment in this case) is the major assumption for estimating the future population contributed by new residential development. The coefficients in Table 11 represent the Committee's best judgment of the existing (1975) average household sizes in Alexandria. Using these existing coefficients for projections through the next twenty years assumes no further decline in average household size and no major changes in the size and character of the dwelling units within the three residential land use types.

2. Employment: The relationship between one thousand square feet of gross floor area (i.e., the total enclosed area of a building including hallways, lobbys, arcades, etc.) of the four commercial land use types (retail, office, motel, and industrial) and the average number of employees working in that area is used to project the additional employment attributable to new development. These relationships are based on national standards and local studies.

Table 11
Table of Impact Coefficients

Impact Areas Impact per	Single Family (O.C.)	Garden Apts. (D.E.)	Elevator Apts. (D.D.)	Retail (1000 $\frac{1}{2}$ EPA)	Office (1000 $\frac{1}{2}$ CPA)	Motel/ Hotel (Units)	Industrial (1000 $\frac{1}{2}$ CPA)
Demographic and Social Impacts							
Population (Residents)	2.5	2.3	1.55				
Employment (Employees)				2	4.25	.5	1.35
Schools (Public School Children)							
Grades K-6	.281	.094	.013				
7-8	.083	.018	.004				
9-10	.083	.016	.005				
11-12	.075	.013	.007				
Total	.522	.141	.029				
Parks and Recreation (Public private acreage necessary to maintain present park acreage per resident ratio)	.0100	.0092	.0062				
Environmental Impacts							
Sewage (Gallons/day)	200	152	104	139	102	197	75
Water (Gallons/day)	250	161	109	146	107	207	79
Solid Waste (Tons/year)	1.65	1.01	1.01	.50	1.00	1.095	.3375
Electricity (Kilowatts)	24 ¹	15	15	34.1	10.2	15.8	2.5
Air Quality	2						
Transportation Impacts							
Automobile Trips							
A.M. Peak Hr- In	.19 ³	.13	.10	0	1.60	.30	.31
A.M. Peak Hr- Out	.62	.43	.31	0	.20	.30	.06
P.M. Peak Hr- In	.82	.57	.41	1.67	.38	.32	.08
P.M. Peak Hr- Out	.44	.31	.22	1.67	2.31	.21	.30
Transit Person Trips							
A.M. Peak Hr- In	.26 ⁴	.18	.14	0	2.08	.42	.40
A.M. Peak Hr- Out	.84	.58	.42	0	.26	.42	.08
P.M. Peak Hr- In	1.10	.77	.55	2.5	.50	.45	.10
P.M. Peak Hr- Out	.60	.42	.30	2.5	3.0	.30	.39
Pedestrian Trips							
P.M. Peak Hr.	1.70 ⁵	1.19	.85	5.0	3.5	.75	.49
Parking Required by Zoning Ordinance							
Plan. Dist. I	1 ⁶	1.275	1.225	4.35	2.5	1.07	0.2
Plan. Dist. II	1	1.275	1.225	4.78	2.75	1.07	0.2
Plan. Dist. III	1	1.275	1.225	5.22	3.00	1.07	0.2

¹ Kilowatt is a capacity measure, not a measure of usage over a specific time period.

² PPM of CO contributed by each 1,000 vehicles added to P.M. peak hour traffic on road segments impacted by the development. To allow for buses and service vehicles, the number of autos in the P.M. peak hour is multiplied by 1.05 to obtain total vehicles generated by the development. The chart at left shows ppm of CO contributed by each 1,000 cars, for various years and various average speeds; it assumes a 10° wind angle. The chart at right is used in addition to the one at left if an intersection is the primary impact point; it assumes an 80° wind angle for the crossing roadway.

PPM CO Added Near Roadside
by each 1,000 Cars
(10° wind angle)

	10 mph.	20 mph.	30 mph.	40 mph.
1975	7.6	4.2	2.9	2.3
1980	2.4	1.3	.9	.7
1985	1.1	.6	.4	.3

PPM CO Added Near Roadside
by each 1,000 Cars
(80° wind angle)

	10 mph.	20 mph.	30 mph.	40 mph.
1975	1.9	1.1	.7	.6
1980	.6	.3	.2	.2
1985	.3	.2	.1	.1

³ The number of automobile trips generated by a given unit of new development is derived from the following equation: $K_1 Z_1 (1 - X_1 - Y) + K_2 Z_2 (1 - X_2 - Y)$ where K_1 = auto trip generation constant (provided in the impact coefficient table); X_1 = % transit trips (directed toward center city); X_2 = % transit trips (not directed toward center city); Y = % pedestrian trips; Z_1 = % of all vehicular trips directed toward center city; Z_2 = % of all vehicular trips not directed toward center city.

⁴ The number of transit person trips generated by a given unit of new development is derived from the following equation: $K_3 Z_1 X_1 + K_4 Z_2 X_2$, where K_3 = transit person trips generation constant (provided in the impact coefficient table) and the other variables are as defined in Footnote 3.

⁵ The number of pedestrian trips generated by a given unit of new development is derived from the following equation: $K_5 Y$ where K_5 = pedestrian trip generation constant (provided in the impact coefficient table) and Y = % pedestrian trips (in relation to all person trips).

⁶ Maximum of 25% parking space reduction for mixed use development with good access to rapid rail or other mass transit (CO zoning only and at City Council discretion).

3. Schools: These coefficients estimate the average number of public school children that will be contributed to the school system by each dwelling unit for the three dwelling unit types. The relationships have been calculated based on a survey of apartments conducted in 1974 by the school board staff. Again, applying these relationships to new development over the next twenty years is predicated on the assumption that average household size and the age composition of those households will not change dramatically during the study period. It is important to remember that public school children represent only 60 percent of the persons aged 5 - 19 in the City of Alexandria; the remaining 40 percent either are in private school, college, or not in school. That each garden apartment unit produces only $\frac{1}{4}$, and each elevator apartment unit only $\frac{1}{20}$ th of the number of public school children generated by a single family dwelling is especially significant.

4. Parks and Recreation: A ratio of 4.0 acres of parkland per 1,000 residents was derived by adding the recreation acreage at the public school sites (excluding areas covered by buildings) and City parks (a total of 450 acres) and dividing by the estimated population of the City on October 1, 1974 (113,900 persons). The recreation acreage total does not include approximately 150 acres of federally-owned land at Daingerfield Island and at Jones Point, some of which is open to the public for recreation. The existing ratio of 4.0 acres of City-owned recreation land per 1,000 residents in Alexandria is expressed in terms of acres of parkland per dwelling unit in Table 11. The Committee does not recommend this ratio as a minimum park standard for the City; it is used only to describe the number of acres of parkland (either private or public) that would have to be created in order to maintain the park acreage/1,000 residents ratio that exists in Alexandria today. City staff is currently developing a recreation master plan which will address the question of appropriate park standards for Alexandria.

B. Environmental Impacts

1. Sewage and Water: The amounts of water consumed and sewage produced in Alexandria are closely tied. In 1974 the average daily sewage flow was approximately 12.75 MGD (million gallons a day) while the rate of water consumption

was 14 MGD. Thus, the ratio of sewage flow to water consumption was roughly 90 percent. This indicates that approximately 10 percent of the water entering the water mains to service residences and commercial establishments is lost to leakage, true consumption (water used for cooking or drinking, for instance), and for watering gardens and lawns. The remaining 90 percent of the water entering the system leaves residences and commercial establishments to enter the sewage treatment system. Based on this overall 90 percent ratio, a water consumption/sewage flow ratio of .80 is assumed for single family dwelling units (because of lawn and garden sprinkling) while a ratio of .95 is assumed for all other land use categories. The Director of Transportation and Environmental Services provided consumption estimates of 100 gallons of water a day per person for single family dwelling units and 70 gallons of water a day per person for apartment units. Non-residential land use water consumption rates have been estimated in accordance with Arlington County records.

2. Solid Waste: Solid waste is measured in tons per year. These factors were derived from recent Arlington County records. It should be noted that the City is only responsible for solid waste collection for single family dwellings.

3. Electricity: Energy consumption is a complex and controversial subject. This study addresses electricity only. The factors presented in the table are derived from kilowatt capacities cited by VEPCO as necessary to serve typical land use types in Northern Virginia. The factors are based on present construction technology and the assumption that electricity would be the only source of energy.

4. Air Quality: The air quality impact analysis focuses on carbon monoxide (CO) pollution, which is the principal and most serious air quality impact of the developments which are expected in the potential growth areas. The amount of CO pollution is related directly to the amount of traffic generated by the development and to the degree of concentration of that traffic on road segments or at intersections near the development areas.

The Committee desired to obtain a "worst case" view of the air pollution impact of the developments expected in the

growth areas. This approach makes it possible to identify the areas where there will clearly be no problem of air quality degradation and the areas where more detailed analysis (including possible use of monitoring equipment) should be considered. The "worst case" conditions which are incorporated in the CO pollution calculations contained in this report are as follows: 1) rush hour traffic conditions, 2) measurement of pollution near the roadside, and 3) unfavorable weather conditions (such as low wind speed). Therefore, the calculated levels of pollution will occur infrequently.

C. Transportation Impacts

1. Automobile Trips, Transit Person Trips and Pedestrian Trips: Average person trips entering or leaving a given unit of a land use type in the morning or afternoon rush hour have been calculated and published by traffic consultants and professional societies (a trip is normally defined as a one-way journey that proceeds from an origin to a destination). The Committee has used these calculations and combined them with assumptions of average number of persons per auto, and modal split (in this study the percentage of persons travelling by auto, transit, or on foot) in order to calculate the number of automobile trips, transit person trips, and pedestrian trips at the ten growth areas. The morning and afternoon peak hours have been chosen rather than average daily trips generated because the Committee's primary concern is the congestion that might occur on City streets under the worst conditions. The percentage of transit and pedestrian trips assumed is based on the intensity and mix of uses in the new development, access to mass transit, and the direction of the trip (whether it is toward downtown Washington or not). Policy decisions such as incentives to use mass transit or staggered work hours can alter the patterns of trip generations; therefore, these factors should be viewed as advisory, "ball-park" figures.

2. Parking Required by Zoning Ordinance: The Committee feels that the parking requirements of the zoning code are the best estimate of the number of on-site parking spaces that will be provided by new development. In order to provide a point of reference, the number of acres of land that these parking spaces would require if they were constructed

on the surface is calculated. In many cases, however, it is expected that most, if not all, parking will be below surface or in structures.

Revenue-Expenditure Methodology

City Council's charge to the Committee included the directive to evaluate the fiscal impact of anticipated growth on the City's budget. The Committee has estimated the impact of new development on City revenues, operating expenditures, and capital costs.

Basically, the methodology involved an analysis of the City budgets to determine which revenues and expenditures would be affected by growth. Indices were then developed to indicate the estimated amount of revenue or operating costs anticipated for specified units of each major type of development; i.e., a garden apartment unit, 1,000 square feet of office space, etc. These indices were then multiplied by the estimated amount and type of growth in each area to project anticipated revenues and operating costs. Estimated operating costs are based primarily on projections of increased population, employment, and school membership multiplied by fiscal 1975 costs (per capita, per employee, or per school child) for operating programs affected by growth.¹ The techniques for projecting estimated revenues consisted of calculating the anticipated taxable value (property value, sale volume, etc.) created by new development and multiplying this value by fiscal 1975 tax rates.

The impact of capital costs for growth has been estimated in two different ways. First, an estimate has been made of the anticipated increase in annual debt service costs for new capital facilities necessary to accommodate new growth in each study area. If a capital project will primarily benefit a particular growth area, the total annual cost

¹ It is assumed that the current per capita, per employee, or per school child cost of providing services to the existing City residents, employees, or school children, is a reasonable estimate (assuming constant 1974 dollars) of the future cost of providing services to new residents, employees, or school children.

has been assigned to that area. If a capital project will benefit other areas as well as an individual growth area, the growth area has been assigned a share of the debt service cost considered proportionate to the benefits to be received. The second method for assigning capital costs recognizes that the City's budget already reflects debt service payments for existing capital facilities which will serve new residents and businesses. While the annual payments for already outstanding debt will not be affected by future growth, a proportionate assignment of existing debt service costs to new development provides at least some indication of both past and future capital costs of growth. The basic technique for estimating the capital cost for growth under this second method has been to determine the 1975 per capita and per employee cost for debt service and to multiply this figure by the estimated population and employment increase in each growth area. While this approach can be justifiably criticized on a number of bases, it provides at least a rough approximation of both past and future capital costs for growth.

The indices and cost-revenue projections are useful approximations of the fiscal impact of growth and illustrate the relative fiscal impact of different types and intensities of development. However, it is important to recognize some of the basic limitations.

First, the estimates concentrate solely on the impact of growth on the City's budget. They provide no measure of the overall economic effects of growth on the total City economy; i.e., local payrolls, family incomes, business profits, etc., nor do they measure the costs that existing residents must absorb as a result of growth (e.g., more time spent commuting).

Second, only primary budgetary impacts have been considered. Because of the complexities involved, no attempt has been made to project secondary impacts such as increased sales taxes generated by new residents at existing stores outside of the growth areas. Similarly, it is likely that future capital improvements, beyond those assumed in the study, will be necessary, at least in part, to accommodate new growth.

Third, the cost-revenue projections are estimates of the fiscal impact of growth during the next twenty years, expressed in fiscal 1975 terms. Thus, the same revenues and

costs are assigned to a unit of growth in 1976 as to the same type of unit in 1994. All projections are based on fiscal 1975 taxes, tax rates and cost levels. No changes have been projected in service levels, tax structures, tax rates, or costs. No allowance has been made for any relative changes in property values.

Fourth, the cost-revenue estimates are based on the Committee's best judgment as to the type, quality, and amount of development which is likely to occur or be permitted in each growth area. Obviously, any substantial change in any of these assumptions would affect these estimates.

Despite these limitations, the Committee believes that these indices and projections provide useful approximations of the incremental fiscal impact for different types of development and a reasonable estimate of the overall fiscal impact of likely development in each growth area.

A. Operating Revenues

In order to relate given units of land use (the three residential and four commercial categories used throughout this study) to the estimated City revenues and costs that they would generate, it was first necessary to determine which forms of revenue increase as a result of new construction and which do not. This assumption and all subsequent assumptions necessary to produce the expenditure-revenue analysis included in this report basically follow the methodology used in the Cameron CO Development Staff Report of April, 1974, prepared by City staff. Table 12 presents the City's operating budget revenues as shown in the approved FY 1974-1975 budget. These revenue sources were divided into two categories - those which are thought to be affected by development and those which are not. Subsequently, for those revenue sources affected by development, an estimate of the revenue accruing from each new unit of development (by type of development) was derived. For the real estate tax revenues, this estimate is simply the current tax rate times the estimated assessed value of a new unit. Other revenue items must be pro-rated among the various land use categories on the basis of the number of residents, employees, or public school children generated by new developments. For

Table 12

Alexandria's
Revenues and New Development

Budget Classification	Approved Budget FY 74 - 75	Affected by Development
<u>General Property Taxes</u>	<u>35,458,750</u>	
Real Estate Taxes	27,133,750	Yes
Personal Property Taxes	4,400,000 ¹	Yes
Other	3,925,000 ¹	No
<u>Other Local Taxes</u>	<u>9,260,000</u>	
Utility Taxes	4,200,000	Yes
Bank Stock Tax	70,000	No
Real Estate Recordation Tax	140,000	Yes
Local Sales Tax	4,000,000	Yes
Cigarette Tax	750,000	Yes
Transient Lodging Tax	100,000	Yes
<u>Licenses, Permits, Fees</u>	<u>4,886,500</u>	
Motor Vehicle Licenses	1,270,000	Yes
Business, Professional Licenses	2,700,000 ²	Yes
Other	916,500 ²	No
<u>Court Fines, Fees, Costs</u>	<u>433,300</u>	
Fines, Fees, Costs	400,000	Yes
Justice of the Peace Fees	25,000	Yes
Other	8,300	No
<u>Revenues from Money and Property</u>	<u>1,255,300³</u>	No
<u>Revenues from Other Agencies</u>	<u>3,543,000</u>	
A.B.C. Profits	425,000	Yes
Wine Tax	40,000	Yes
Sales Tax	1,850,000 ⁴	Yes
Other	1,228,000 ⁴	No
<u>Service Charges</u>	<u>350,100</u>	
Sewer Connection Charges	240,000	Yes
Ambulance Service Charges	25,000	Yes
Other	85,100	No
<u>Sale of Services and Materials</u>	<u>118,000</u>	No
<u>Other Revenues</u>	<u>46,000</u>	No
<u>School Revenues</u>	<u>4,154,290</u>	Yes
<u>Total - All Revenues</u>	<u>59,475,240</u>	
Balance Carried Forward	<u>2,260,494</u>	
<u>Total - All Revenues & Bal. Carried Forward</u>	<u>61,735,734</u>	

¹ \$3,300,000 of this sum is from public service corporation real estate taxes.

² \$745,000 of this sum is from building, plumbing and electric permits; fees charged for these permits are not allocated to new development since the costs associated with issuing the permits are not charged against new development.

³ \$700,000 and \$500,000 are respectively interest on general fund investments and interest on bond investments.

⁴ \$718,000 of this sum is state aid for street maintenance.

example, the wine tax is estimated on a per capita basis because the tax is collected by the state and redistributed to local governments on the basis of population. Since both residents and employees are likely to generate Justice of the Peace fees, they are estimated on a per capita and per employee basis. This approach produced the estimated annual revenues shown in Table 13.

Table 13

Annual Revenue Impact Measures
(in 1974 Dollars)

	Single Family (D.U.)	Gdn. Apt. (D.U.)	Elev. Apt. (D.U.)	Retail (1000 $\cancel{\text{sq}}$ ft) GFA)	Office (1000 $\cancel{\text{sq}}$ ft) GFA)	Hotel/ Motel (Unit)	Indus. (1000 $\cancel{\text{sq}}$ ft) GFA)
Medium Priced Unit	1501	813	797	1429	563	496	370
Luxury Unit	1764	965	960	N.A. ¹	N.A.	N.A.	N.A.

¹ Medium priced and luxury unit differentiation only applies to residential units.

B. Operating Expenditures

Table 14 displays the delineation of expenditure items between those which increase due to new construction and those which do not. With two exceptions, expenditures due to new construction were estimated by land use category according to the number of residents, employees, or school children generated by one unit of that particular land use type. For example, the largest single expenditure item in the FY 1974-1975 budget was \$27,235,557, for the operation of the school system; this breaks down to \$1,972.30 expended per public school child (based on public school membership of 13,809 as of October 1, 1974). Use of average cost factors produced the estimated total annual expenditures per unit or per 1,000 square feet of gross floor area shown in Table 15.

Table 14

Alexandria's Operating
Expenditures and New Development

Budget Classification	Approved Budget FY 74-75	Affected by Development
<u>Legislative and Executive</u>	371,832	Yes
<u>Administration of Justice</u>	1,082,941	Yes
<u>Staff Agencies</u>		
Finance	604,869	Yes
Real Estate Assessments	261,008	Yes
Contingent Reserves	1,162,000	No
General Debt Service	6,063,325	Yes
Personnel	95,370	Yes
Planning & Community Development	470,169	Yes
City Attorney	164,671	Yes
Elections	115,661	Yes
General Services	699,646	No
Data Processing	260,008	Yes
Economic Opportunities Comm.	29,496	Yes
City Clerk	110,895	Yes
Subtotal - Staff Agencies (10,037,116)		
<u>Operating Agencies</u>		
Transportation & Environmental Services	4,407,918 ¹	Partial
Fire Department	3,599,294	Yes
Police Department	4,485,836 ²	Yes
Building & Mechanical Inspections	691,892 ²	Partial
Animal Shelter	96,456	Yes
Health Department	895,635 ³	Yes
Social Services Department	896,961 ³	Partial
Recreation & Cultural Activities	1,459,407	Yes
Libraries	802,992	Yes
Schools	27,235,557	Yes
Subtotal - Operating Agencies (44,571,948)		
<u>Capital Improvements</u>	2,500,000	Yes
<u>Metro Bus Deficit</u>	2,465,505	Yes
<u>Urban Renewal</u>	214,301	No
<u>Other Miscellaneous</u>	492,091	No
Total - All Funds	61,735,734 ³	

¹ Cost of refuse disposal and transportation added to 10 percent of remaining Transportation & Environmental Services expenditures was assigned to Affected by Development column.

² Only the cost of street lighting is assumed to be affected by new development, revenue from building, plumbing and electrical permits exceeds the related costs of operating the Building & Mechanical Inspections Department.

³ No impact is assumed for public assistance and indigent medical care items.

Table 15

Annual Operating Expenditure Impact Measures¹
(in 1974 Dollars)

Single Family (D.U.)	Garden Apt. (D.U.)	Elev. Apt. (D.U.)	Retail (1000 ϕ GFA)	Office (1000 ϕ GFA)	Hotel/ Motel (Unit)	Indus. (1000 ϕ GFA)
1488	700	341	76	161	19	51

¹ Excludes debt service and capital outlay costs.

C. Capital Improvements and the Metro Deficit

The expenditure factors in Table 15 do not address the cost of capital improvements associated with new construction at the potential growth areas, nor the Metrobus deficit. Table 16 describes future capital costs that are associated with the ten growth areas and the estimated annualized cost to the City that has been charged to growth area development (Map 14). These capital projects are limited to public improvements undertaken solely or primarily to serve the growth areas. "Sunk" costs of projects that have been completed previously (and may have been undertaken in part to serve future growth) were not addressed. It is probable that additional public improvements, particularly road improvements, will be needed as a result of the combination of likely development at the growth areas and growth in other sections of the City and in adjacent jurisdictions.

The estimate of Metro operating deficits was based on the estimated daily morning and afternoon rush hour transit trips generated by new construction. Because it is impossible to estimate future Metro rail operating deficits, the 1974 Metro bus system's average loss per rider of 27¢ was used to estimate the City's additional subsidy to Metro which will result from development.

D. Summary of Revenue-Expenditure Factors

A summary of revenue and expenditure factors for land

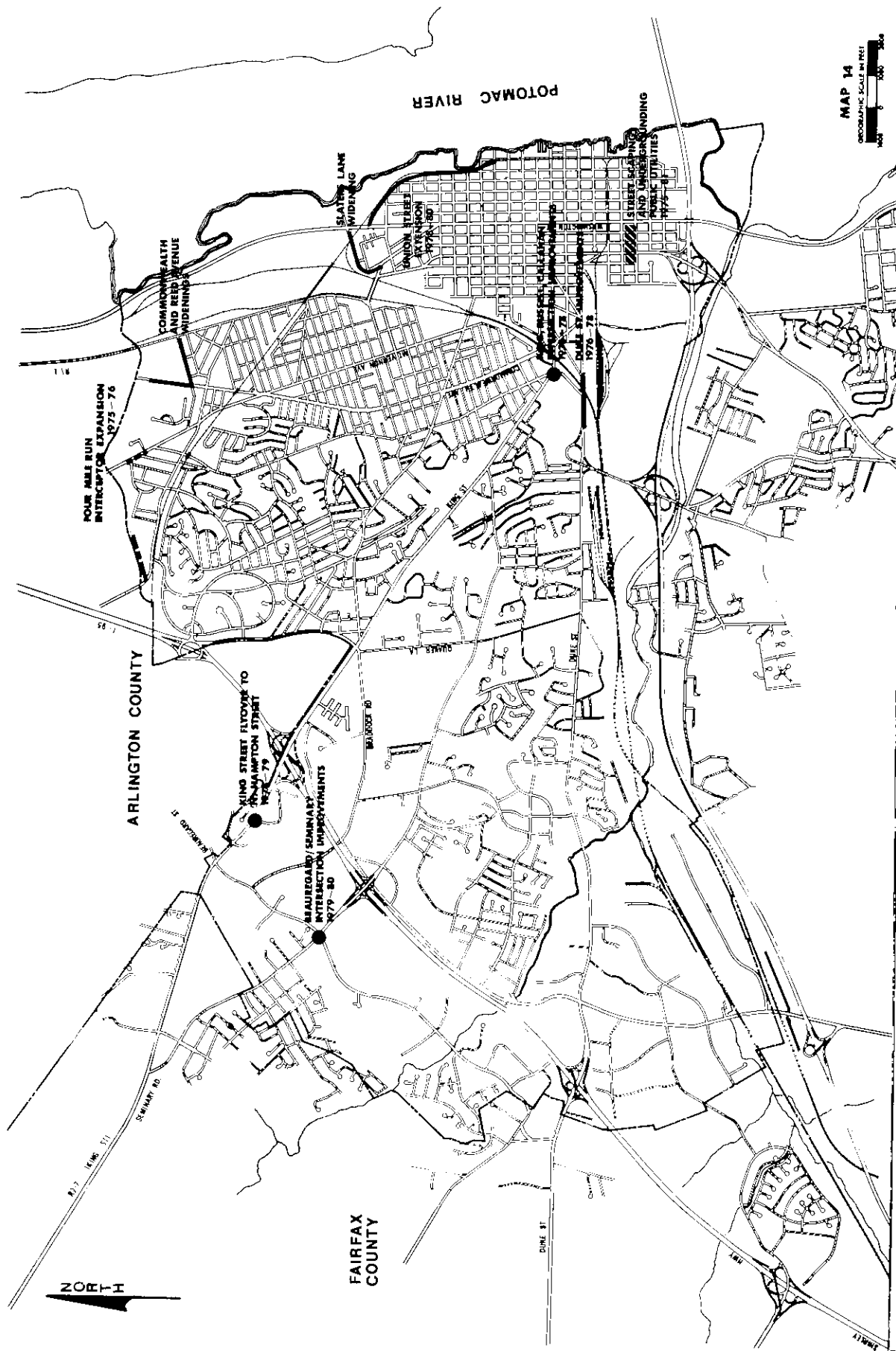
Table 16
City Capital Costs Associated With Growth Areas¹

Growth Area	Project Number ²	Estimated Construction Period	Project Description	City Cost Charged to Growth Area Development	Annualized Cost
Winkler Tract	45-31	1979-80	Intersection improvements at the intersection of Seminary Road and N. Beauregard Street	\$3,000,000	\$261,55
Stone Tract	45-68	1978-79	Flyover to North Hampton Street from Route 7	500,000	43,593
King Street Station	45-33	1976-78	Improvements to Duke Street between Roberts Lane and Diagonal Road, including a new bridge over the RF&P Railroad and a left turn separation at Diagonal Road.	250,000	21,796
	45-33	1976-78	Improvements at the intersection of King Street, Russell Road, and Callahan Drive in conjunction with construction of the rapid transit station there.	0	0
Braddock Road Station North Waterfront	None 45-43	None 1978-80	None Extension of Union Street from Pendleton to the George Washington Parkway (4 lane divided collector)	1,200,000	104,622
Potomac Center Shirley Duke/Regina Dip Commercial	None None 45-75	None None 1975-81	Widening of Slaters Lane to 4 lanes None Streetscaping and Undergrounding of public utilities	500,000 0 200,000	43,593 0 17,437
Arlandria East	None	None	Widen Commonwealth Avenue to 4 lanes from northern end to Reed Avenue, widen Reed Avenue to 4 lanes from Commonwealth Avenue to Route 1.	400,000	34,874
Arlandria West	55-11	1975-76	Expansion of Four Mile Run Interceptor sewer from the intersection of Bruce Street and Mt. Vernon Avenue to the intersection of Florence Drive and Four Mile Road	200,000	17,437

¹ Based on the City of Alexandria's 1974-1975 approved Capital Improvement Program, the 1975-1976 Proposed Capital Improvement Program, and interviews with the Director of Transportation and Environmental Services.

² As listed in the 1974-1975 Capital Improvement Program.

³ Assumes that the City would finance the projects by sale of 20-year bonds at 6% interest.



CITY OF ALEXANDRIA

CAPITAL IMPROVEMENTS CHARGED TO GROWTH AREAS

LEGEND

- SEWER INTERCEPTOR EXTENSIONS
- ROAD IMPROVEMENTS
- STREET BEAUTIFICATION
- INTERSECTION IMPROVEMENTS

DATES ARE ESTIMATES OF PROJECT CONSTRUCTION PERIOD

use categories of new construction is presented below (Table 17). The factors incorporate neither capital costs associated with growth areas nor the estimated contribution to the bus deficit, since these elements vary from growth area to growth area. Two alternate expenditure factors are shown for each land use category. The first-listed expenditure factor and ratio include a proportionate assignment of existing debt service costs to new development. Because there was some debate about whether these costs should be assigned to new development, an alternate expenditure factor and ratio are shown, reflecting exclusion of the existing debt service.

Table 17

Annual Revenues and Expenditures
(in constant 1974 dollars)

	Single Family (D.U.)	Gdn. Apt. (D.U.)	Elev. Apt. (D.U.)	Retail (1000 ∇ GFA)	Office (1000 ∇ GFA)	Hotel/ Motel (Unit)	Indus. (1000 ∇ GFA)
Rev. ¹	\$1501	\$813	\$797	\$1429	\$563	\$496	\$370
Expend. (with debt serv.)	\$1488	\$700	\$341	\$76	\$161	\$19	\$51
Ratio	1.01	1.16	2.33	18.91	3.50	26.25	7.26
Expend. (w/o debt serv.)	\$1369	\$591	\$268	\$52	\$110	\$13	\$35
Ratio	1.10	1.38	2.98	25.57	5.11	38.29	10.58

¹

Residential revenues are in terms of medium-priced units.

The above factors and ratios highlight the differences in budgetary impact of various land use categories. The differences in ratios for the three residential land use categories primarily reflect difference of costs and revenues associated with the public school system (Table 18).

Table 18

Percentage of Residential Expenditures
and Revenues Related to the Public
School System

		Single Family (D.U.)		Garden Apartment (D.U.)		Elevator Apartment (D.U.)	
Rev. ¹	School	226.97	15%	61.31	8%	12.61	2%
	Other	<u>1273.89</u>	85%	<u>751.66</u>	92%	<u>784.42</u>	98%
	Total	1500.86		812.97		797.03	
Expend.	School	1029.54	69%	278.09	40%	57.20	17%
	Other	<u>458.83</u>	31%	<u>421.71</u>	60%	<u>284.19</u>	83%
	Total	1487.92		699.80		341.39	
Ratio		1.01		1.16		2.33	

¹ Residential revenues are in terms of medium priced units.

A detailed listing of assumptions made in this analysis, an explanation of the basis of the assumptions, and a list of references are included in the appendix of the report.

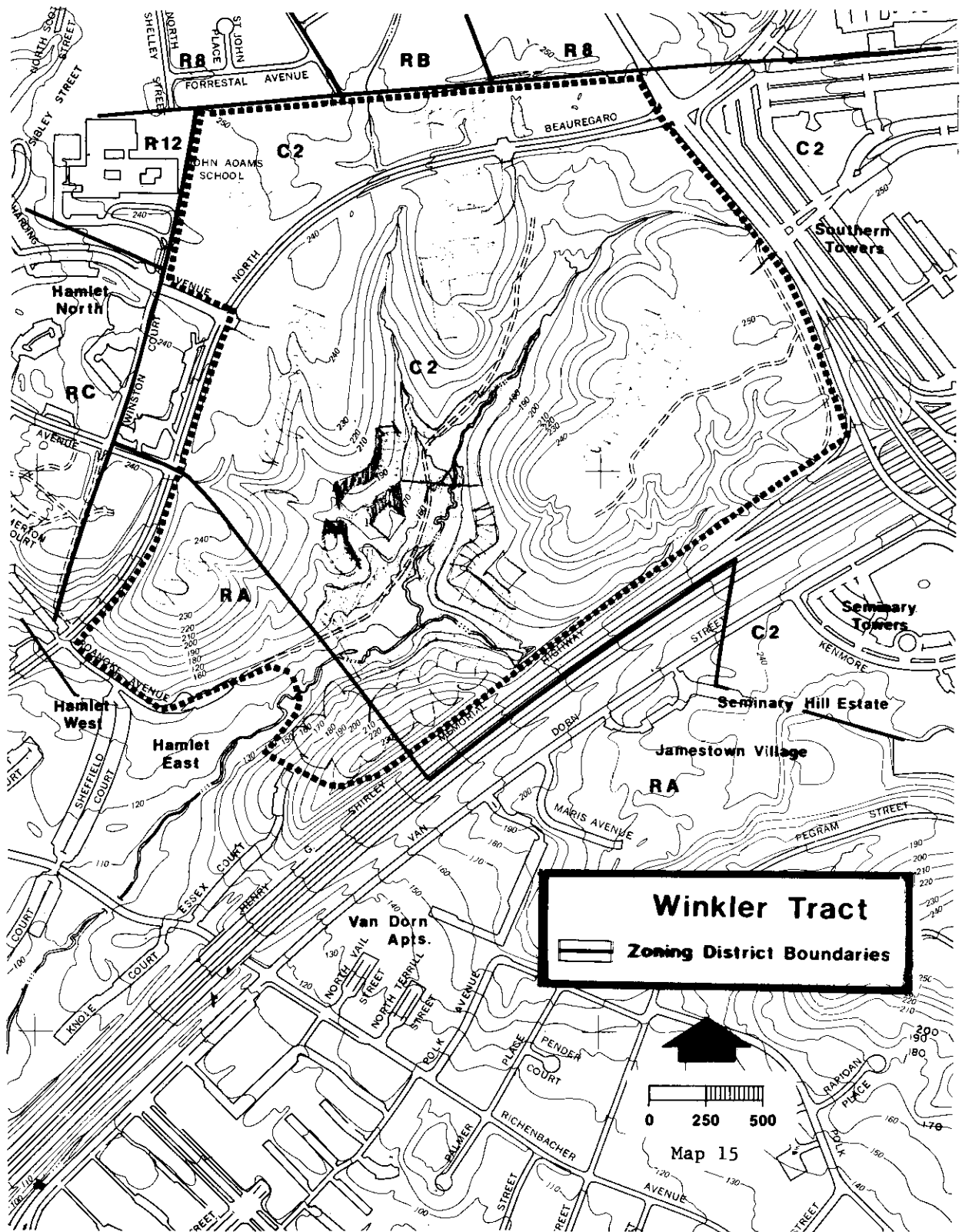
CHAPTER IV: WINKLER TRACT

The Winkler growth area is a 134 acre vacant, wooded tract in the western part of the City just southwest of the intersection of Shirley Highway and Seminary Road. Most of the tract lies between Beauregard and Shirley, although a 20-acre section is north of Beauregard. The tract's moderate slopes (none in excess of about 20%) and its soils are not a constraint on development. Present zoning, a mixture of RA and C-2, with the latter predominant, allows high density development. Properties near the growth area, including some under the same ownership, are developed primarily in garden apartments and high-rises, although there are other uses, including a school, single-family neighborhoods, and a vacant property adjacent to the portion north of Beauregard (Map 15). It is expected that the tract's owner, the Mark Winkler Corporation, will seek to develop the area to the maximum intensity allowed under existing zoning, and that C-0 zoning might be requested for flexibility in design in later phases.

Likely Development

The Winkler Corporation currently foresees (under best conceivable market conditions) development of the 134-acre tract in the following proportions: 70 percent elevator apartments, 25 percent office space, and 5 percent retail space. These proportions were applied to known information - the site's area and the permitted floor-area ratios - to determine the scale of development (in units and square feet) desired by the owner.

The likely development combination (Table 19) will result in construction of 6,000 elevator dwelling units, about 1.5 million square feet of office use, and 170,000 square feet of retail use. The estimate of 1.5 million square feet of office space is based on the site's expected maximum market absorption of 75,000 square feet per year (for 20 years), while the 170,000 retail represents an estimate of the amount of convenience retail necessary to serve the site residents and employees. The first phase of construction could begin as early as 1976 and later phases might be completed in the latter half of the 1980's.



Development of this intensity under the permissive C-2 zoning would produce a development having approximately two and one half times as many dwelling units as Southern Towers, in addition to the office and retail portions which would involve construction of three or four large high rise structures. This level of development is somewhat below what is permitted by the C-2 zoning; the remaining allowable floor-area might be used after 1995, or it might not be used at all.

Table 19

Winkler Tract Likely Development Summary

Elevator Dwelling Units	6,000
Office Space (square feet GFA)	1,500,000
Retail Space (square feet GFA)	170,000

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The completed development would increase the City's population by an estimated 9,300 persons, representing an 8 percent increase in the estimated 1974 population. Planning District III's population would increase by 18 percent over 1974 levels. The great majority of these would be young adult professionals who work in government and other white-collar service sectors. Their incomes will probably fall primarily in the upper middle range; most households will have dual incomes.

2. Employment: The use of a major proportion of the gross building area for commercial purposes would have a substantial effect on the City's work force (number of persons who work within the City), increasing it by 6700. Most of the employees would be office workers in the mix of government agencies, law firms, consulting firms, real estate agencies, and finance - insurance companies which would occupy the space. Some workers would come from the associated high-rise residential development, but most would commute

Table 20

Winkler Tract

Likely Development Impacts Summary

<u>Impact Area</u>	<u>Magnitude of Impact</u>
<u>Demographic and Social Impacts</u>	
Population	9300 persons
Employment	6760 persons
Schools	
K-6	78 public school children
7-8	30 public school children
9-10	30 public school children
11-12	42 public school children
<u>Environmental Impacts</u>	
Sewage	801,000 gallons/day
Solid Waste	7600 tons/year
Water	839,000 gallons/day
Electricity	111,000 kilowatts
Air Quality	See text.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	2045 trips
A.M. Peak Hour, Out	1170 trips
P.M. Peak Hour, In	1820 trips
P.M. Peak Hour, Out	3315 trips
Transit Person Trips	
A.M. Peak Hour, In	880 trips
A.M. Peak Hour, Out	1030 trips
P.M. Peak Hour, In	1430 trips
P.M. Peak Hour, Out	1535 trips
Pedestrian Trips	1375 trips
Parking Required by Zoning Ordinance	12,737 trips (90.6 acres of surface area)

¹ For north bound trips, assumes modal splits (auto/transit/walking) of 50/40/10 for residential uses, 65/25/10 for office uses, and 50/10/40 for residential uses. For south bound trips, assumes modal splits of 55/35/10 for residential uses, 75/15/10 for office uses, and 50/10/40 for retail uses.

from Arlington, Fairfax County, or other parts of Alexandria.

3. Schools: Present elementary school service area boundaries indicate that Winkler Tract students would attend either the paired Ramsay - Houston schools or the paired Kelly-Tyler schools. These schools now have excess capacity sufficient to absorb the 78 added elementary school children from the Winkler Tract. The Winkler development alone will not cause any strain on the schools serving upper grade students.

4. Parks and Recreation: Study of the existing recreation acreage-to-population ratios in the neighborhood containing the Winkler Tract (area west of Shirley and south of Seminary) reveals that existing open space acreages are marginally adequate to meet present needs. The Ramsay and Adams school grounds provide about 30 acres which include playing fields, play equipment, and other facilities. The 26 acre Rolf's tract and the 8.5 acre Rynex Drive natural area (both recent acquisitions) will remain as natural areas intended to serve the entire City population, not just the local neighborhood.

In general, it appears that the Winkler Tract population will require more open space for the active recreation pursuits (such as field sports and various types of court sports) of young adults who are becoming the dominant element in the population. If the present ratio of 4.0 acres of public open space acres per 1,000 population is to be maintained, 37.2 acres of parks must be added as a result of the population growth generated by the Winkler Tract.

B. Environmental Impacts

1. Sanitary Sewers: Eight hundred and one thousand gallons per day additional sewage will result from the development. The trunk line serving the area has more than sufficient excess capacity to handle this additional flow.

2. Water: The Winkler area's estimated daily demand for water (839,000 gallons per day) can be accommodated by the existing trunk line. The overall metropolitan water supply situation is evaluated in a subsequent section.

3. Solid Waste: The proposed development will generate

7600 tons per year of added solid waste. Solid waste disposal problems are discussed in the context of all ten growth areas in a subsequent section.

4. Electricity: The development of the site would cause an increase of 111,000 kilowatts in the demand for electricity. This impact is discussed in a City-wide context in a subsequent section.

5. Air Quality: Air quality in the vicinity of the Winkler Tract is affected primarily by emissions from automobiles using the major routes adjacent to it; some diminution in quality will result from the traffic generated by the development. Because of high traffic volumes on both Shirley Highway and Seminary Road, roadside pollution levels at their intersection at times of very unfavorable meteorological conditions are already high, and traffic generated by the Winkler Tract development will add 29 percent to existing CO pollution (Table 21). "Existing" pollution levels in the table are based on the present traffic volumes on Shirley (9900 cars both directions) while "added" pollution levels are derived from the estimated amount of Winkler Tract traffic which will pass through the Shirley - Seminary intersection.

Table 21

CO Concentrations at Completion of Likely Development
Shirley - Seminary Intersection
(in parts per million at P.M. rush hour)

Emission Factor Year	20 mph Average Speed			40 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	41.6	12.2	53.8	22.8	6.7	29.5
1980	12.9	3.8	16.7	6.9	2.0	8.9
1985	5.9	1.7	7.6	3.0	.9	3.9

¹ The estimated CO concentrations decline over the emission factor years because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worst case assumption (i.e., average vehicle emissions will not decline).

The total pollution for the 1975 mix of automobiles will exceed the national one-hour CO standard of 35 ppm if average speed is 20 miles per hour, and at 40 miles per hour average speed, the total CO level of 29.5 ppm will reach 85 percent of the standard. Because the 1980 and 1985 mixes of automobiles will probably generate less pollution (assuming improving emission control in the future), CO levels are considerably below the maximum acceptable level for those years.

The existence of a large forested area on the Winkler property has important positive effects on the area's air quality. Excessive clearing of trees might contribute to a decline in quality by removing a significant natural source of purification.

6. Noise: Because of heavy traffic volumes on Shirley Highway, noise disturbance to the site could be a problem. However, the large size of the tract will offer opportunities for sufficient setback and there is a natural topographic buffer as slopes generally grade upward from Shirley into the tract. For these reasons, the noise problem at this growth area can be easily resolved.

7. Storm Water: The Winkler Tract is within the watershed of Holmes Run, which the City plans to improve to accommodate a 100-year frequency flood. On-site retention of storm water will be desirable nonetheless to help assure that the channel's design capacity is not exceeded.

C. Transportation Impacts

1. Automobile Trips: Because of the large number of automobile trips generated by the likely development (5135 in P.M. rush hour), traffic impacts will be the most serious single problem associated with the Winkler tract development. A large proportion of the traffic will probably use, or attempt to use, Shirley Highway in commuting to or from the area. Unfortunately, however, Shirley will probably already be carrying traffic beyond its capacity when the Winkler development is completed. A subsequent section of this report analyzes the combined impact of the expected Stone and Winkler developments on the Shirley corridor situation, including conditions on arteries which feed traffic to Shirley,

such as King and Seminary.

The Winkler traffic may cause particular problems in three places:

(1) The outbound P.M. rush hour traffic of 3315 cars will probably exceed the combined capacities of the signals at the Seminary - Beauregard intersection and at the development's access point on Seminary. A major bottleneck could develop at Beauregard - Seminary unless there is improvement of this intersection.

(2) Winkler development traffic may overload the capacity of the ramp leading from Seminary to southbound Shirley by adding over 800 cars to the volume attempting to use the ramp.

(3) Congested conditions on Seminary and Shirley will force some traffic south on Beauregard in the P.M. rush hour and this concentration may strain the capacity of the Beauregard - Sanger intersection.

2. Transit Person Trips: Development of the tract will generate a total of 1910 transit person trips in the morning rush hour, and 2970 transit trips in the evening rush hour. This additional demand will require more buses at more frequent intervals along the Shirley Highway and Seminary Road corridors.

D. Fiscal Impacts

The Winkler Tract's estimated fiscal impact ratio of 2.04 places it sixth among the ten growth areas (Table 22). This growth area ranks low in terms of estimated budgetary impacts because the likely development has relatively less retail than most of the higher-ranking areas and does not include a hotel (hotel and retail uses have the highest revenue - expenditure ratios among land uses). The expenditure side includes the cost of a grade separation at the Beauregard - Seminary intersection, because this improvement (which is listed in the City's current capital improvements program) will be necessary to accommodate traffic generated by the Winkler development.

Table 22

Winkler Tract Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Elevator Dwelling Units (6,000)	5,272	2,502	2,770
Office Gross Floor Area (1,500,000 ϕ)	844	330	514
Retail Gross Floor Area (170,000 ϕ)	243	25	218
Capital Costs	--	262	- 262
Totals	6,359	3,119	3,240
<u>Revenue/Expenditure Ratio: 2.04</u>			
Alternative Totals ¹	6,359	2,597	3,762
<u>Alternative Revenue/Expenditure Ratio: 2.45</u>			

¹ Alternative calculations exclude existing debt service from expenditures.

Conclusions and Recommendations

The proposed development of the Winkler Tract will inevitably have two serious effects. First, a project of the size now contemplated must aggravate an already serious traffic problem on nearby streets. Second, it will result in substantial destruction of one of the City's few remaining large wooded areas.

With respect to the traffic problem, the new development should not proceed until adequate facilities, such as the proposed improvements at the Seminary - Beauregard intersection, have been provided to serve foreseeable transportation demands. Further, new large scale developments, such as Winkler, should be designed to encourage maximum possible use of mass transit.

At the Winkler Tract, existing highways will simply be unable to absorb the increased automobile traffic from the likely development. The traffic generated by 1.5 million square feet of office space will exceed existing rush hour capacity even if little independent growth in traffic levels occurs prior to the estimated 1995 completion date.

To meet this problem and to preserve a reasonable level of service on adjacent streets, the office space at the site should be limited to one million square feet. One way of effecting this proposal is for the City to reduce allowable floor-area-ratios for the C-2 zone, the category under which this tract is zoned.

The Washington Metropolitan Area Transit Authority (WMATA), the City, and the developer should take coordinated steps to encourage use of public transit, especially the express buses on Shirley Highway. WMATA should create new bus routes; the City should impose artificial restraints on the use of cars during rush hours (such as high parking fees at certain hours or preferred lanes for buses); and the developer should provide sheltered bus stops with good access from arteries. In addition, presence of adequate shops and stores to serve the residents of the area will help reduce automobile traffic.

The City should seek to preserve as much of the tract as possible in an undeveloped state by promoting compact rather than sprawled development. The developer, wishing to avoid the delays and difficulties of obtaining CO zoning, at the present time intends to build within the City's standard height limitation of 150 feet (unless the economics of new fire code regulations requiring sprinkler systems in buildings over 75 feet high force him to build lower structures). The City should dissuade him from this course so that fewer but taller buildings could be placed on the site, leaving as much as 50% of the site in its natural state. In particular, the existing stream valley should be converted into a park area open to all citizens and not paved over. Easing of the 150 foot height limit will probably be necessary to accomplish these goals.

The developer can alleviate many of the problems resulting from development of this tract if he replaces trees cut down during construction with trees planted along streets

and throughout the project. Retention of as much as possible of the site's vegetation (and replacement of trees removed) will help maintain reasonable ambient air quality in this area of the City.

The design of the project will greatly affect its impact on the City, although Council's authority in this area is limited absent a request for CO zoning. The developer should scale heights away from the existing Hamlet garden apartments, should conceal parking (preferably underground), and should provide a pedestrian circulation system and run-off impoundment areas within the site. The developer should also screen the project from bordering streets and highways by use of existing trees.

Neighborhood parks in the area barely meet present needs, and it is therefore imperative that the proposed development include sufficient recreational facilities to meet the needs of its planned resident and employee population, including some play equipment for young children. (Similarly, the development should include adequate community center facilities.)

In order to avoid the barren sameness of many developments in the area, the project should contain a wide mix of unit sizes and prices, including if possible some for the elderly and for people of moderate incomes.

The likely level of development needs no rezoning or other substantive approval; the first phase should begin before 1980. If an effort is to be made to reduce allowable density, Council must move quickly. It is also mandatory that the City refrain from willy-nilly widening of streets in nearby neighborhoods to accommodate traffic from the development. Instead, the City should take stringent measures to direct automobile traffic from the project onto Shirley Highway, to promote use of public transit, and to foster mixed development.

CHAPTER V: STONE TRACT

The Stone Tract consists of 89.4 acres in the western part of the City at the intersection of Shirley Highway and King Street (Route 7). Although there are some moderately steep (15-20 percent) slopes in the area, they are not extensive enough to be a major constraint to development. Soil conditions permit high density development. The growth area lies in the headwaters of Lucky Run, with the South Lucky Run Flood District encompassing about 16 acres in a 200-foot wide north-south oriented belt running through the tract.

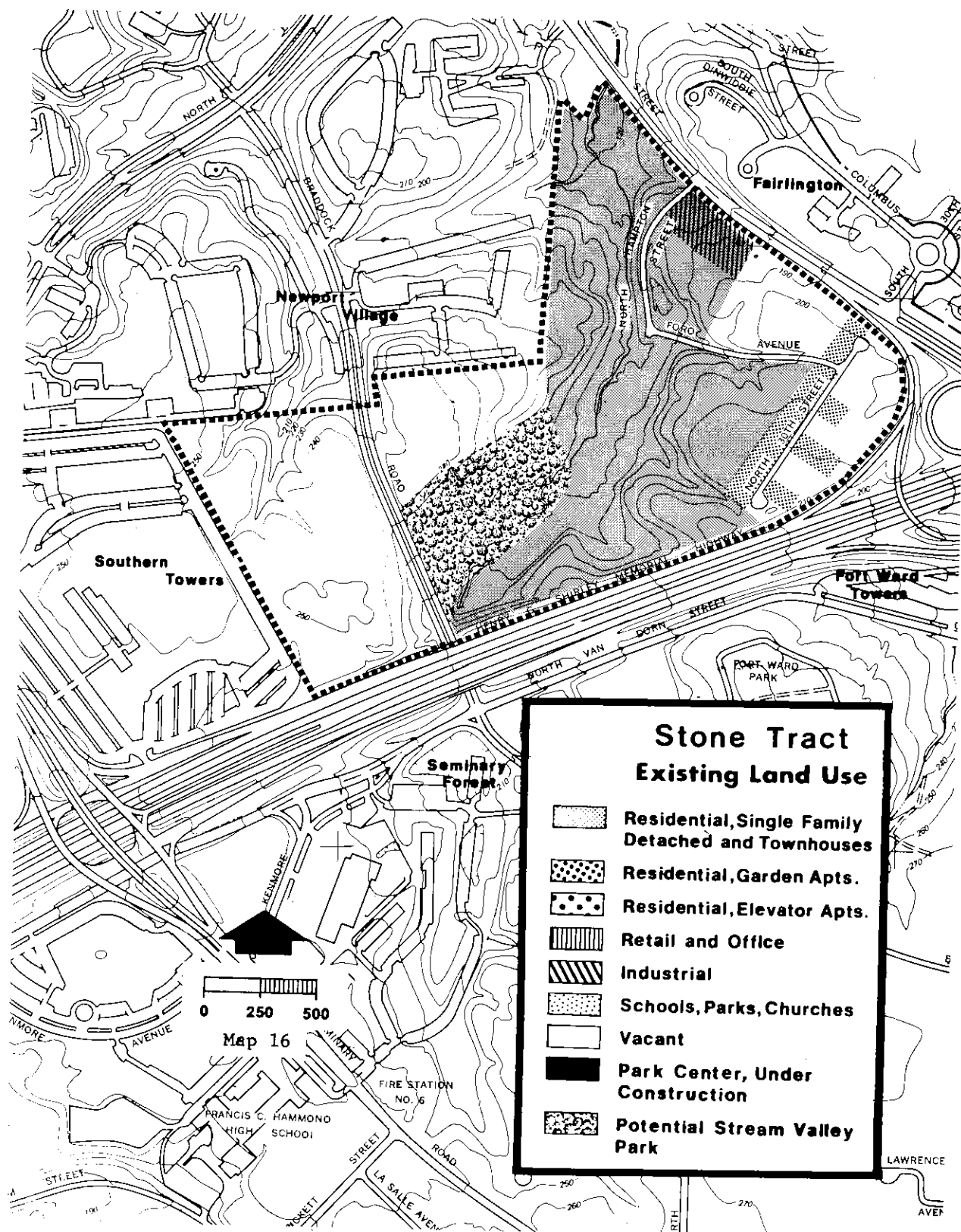
The tract's principal owners are the Stone Tract Associates, holder of the 41-acre area of the Park Center development, and the Stone Estate, which has retained 33 acres spanning Braddock Road in the southern part of the area. The remainder of the growth area, 11.4 acres in the northeast part, is in various small individual holdings. Existing land use consists of the Stone Motel and a service station on King Street, seven houses in the northeast corner, and the first phase of Park Center, which is under construction (Table 23, Map 16). The Park Center portion is zoned C2 along King Street and RC in the remainder, while the Stone Estate properties are zoned entirely RC (Map 17). The smaller northeastern section is zoned R12 for single-family use (9.9 acres) and C2 commercial (1.5 acres).

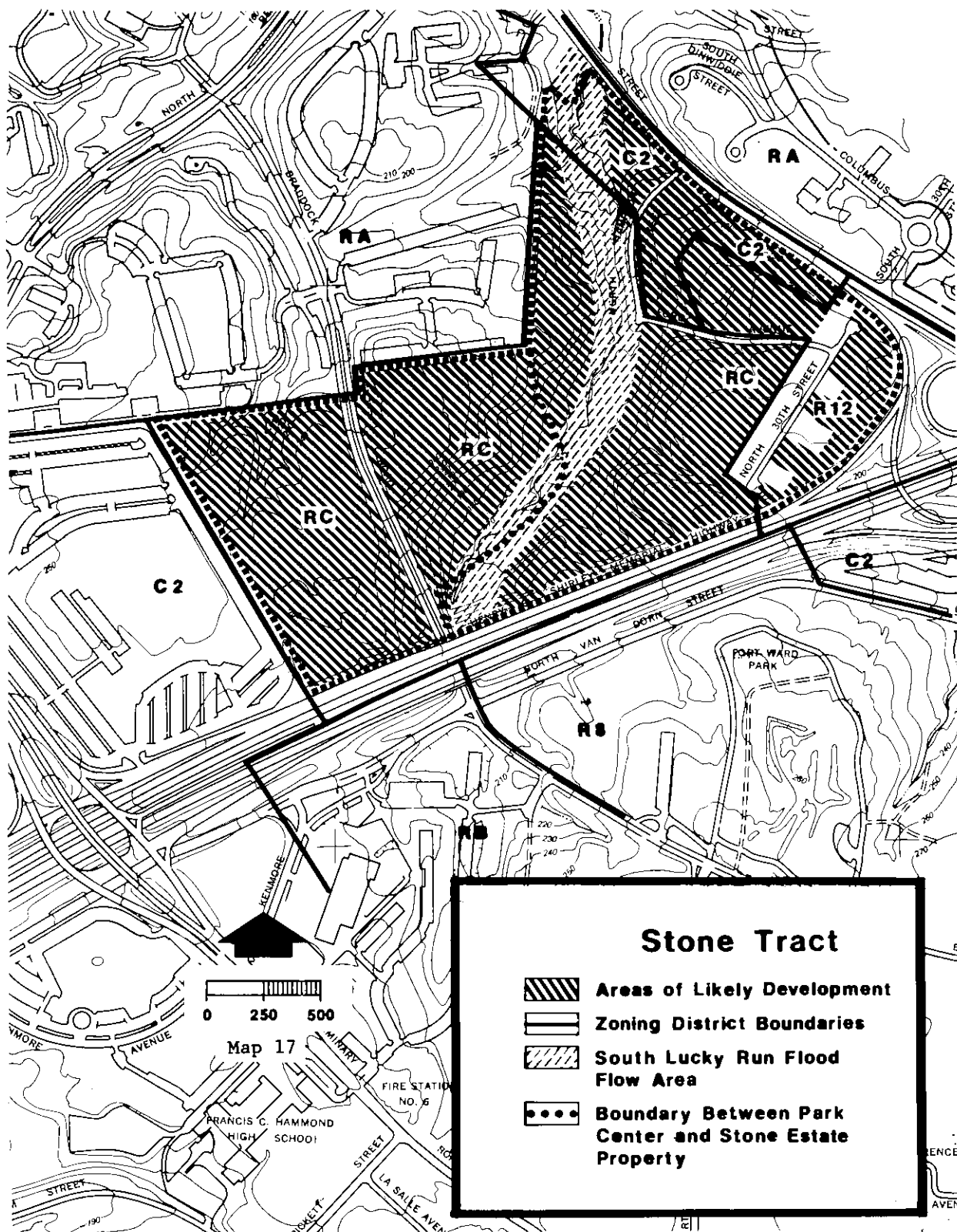
Table 23

Stone Tract, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Commercial	1.6	.25	Commercial (all C2)	10.5
Service Station	.4	.18	Residential	
Motel	1.2	.27	R-12	10.9
Residential	3.3 ¹	.06	RC	64.0
Park Center	39.8	1.75		
Vacant	40.7	--		
Right-of-way	4.0		Right-of-way	4.0
<u>Total</u>	89.4		<u>Total</u>	89.4

¹Excludes area occupied by motel, which will eventually be incorporated into the Park Center development.





Likely Development

Development of Park Center has already begun. According to the developer's overall plans, the completed development will include 74 townhouses, 1390 elevator dwelling units, approximately 450,000 square feet of retail space and 706,000 square feet of office space, and a 330 room hotel. Construction of the entire development will require between five and ten years.

The Stone Estate portion will be developed primarily for residential use, although there will probably be some service retail and professional office uses (less than 5 percent of total floor area) in portions of the ground floors of the structures. The estimated development includes 1750 elevator dwelling units, 54,000 square feet of professional office space, and 19,000 square feet of service retail. It is unlikely that the development will be started before the early to middle 1980's, after Park Center has been completed and marketed.

Site amalgamation, rezoning, and related problems will probably prevent extensive redevelopment in the northeast part of the growth area during the next 20 years. Existing single-family homes will probably remain, but some infill under RT permitted densities (or some other zoning category compatible with the existing houses) will probably occur on the 6.2 acres of vacant R12 land. Also, the 1.5 acres of C2 zoning in this area is likely to develop with residential uses at the permitted 54.45 units per acre.

Table 24

Stone Tract, Likely Development Summary

	Town- houses (D.U.)	Elev. Apts. (D.U.)	Office Space (sq GFA)	Retail Space (sq GFA)	Hotel/ Motel (Units)
Park Center	74	1390	706,000	451,000	330
Stone Estate	0	1750	54,000	19,000	0
Northeast Corner	76	80	0		0
Total Likely Development	150	3220	760,000	470,000	330

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The estimated 5400 additional persons living in the tract after completion of the likely level of development would increase the City's 1974 population by almost 5 percent. Because the dwellings on the site will be condominium units with a price range beginning in the middle \$40,000's, the occupants will have above average incomes. They will probably be primarily young couples with few or no children, or older couples who no longer have dependents.

2. Employment: An estimated 4300 persons will work in the growth area after completion of the office, retail, and hotel portions of the development, representing an 8 percent increase over the 1974 City work force. Because of the presence of the hotel and a substantial proportion of retail in the commercial portion, the jobs created will include a relatively large proportion (25%) of clerical and service jobs for persons who do not qualify for the professional, technical, and managerial positions needed for office developments.

3. Schools: Under present school districting, Stone Tract students will attend the paired Kelly and Tyler elementary schools. The 85 additional elementary-age students will not strain the resources of these schools. Students from the developments will not overburden the junior high, middle school, and high school serving the area.

4. Parks and Recreation: At present, the only public open space areas in the neighborhood encompassing the Stone Tract are the grounds of Tyler School and of Northern Virginia Community College (the neighborhood is defined as the area bounded by Seminary Road, Shirley Highway, and the City boundaries). The Community College has some land area which is suitable for passive recreation, but open areas for field sports and other active recreation pursuits are minimal. Tyler School has one baseball field and enough other vacant areas to constitute a second playing field.

The 38-acre Fort Ward Park is located just across Shirley Highway from the Stone Tract. However, it is not easily accessible to the tract's residents, and in any case, is designed primarily for passive recreation uses.

Table 25

Stone Tract

Likely Development Impacts Summary

Impact Area	Magnitude of Impact
<u>Demographic and Social Impacts</u>	
Population	5400 persons
Employment	4300 persons
Schools	
K-6	85 public school children
7-8	25 public school children
9-10	30 public school children
11-12	35 public school children
<u>Environmental Impacts</u>	
Sewage	572,000 gallons/day
Solid Waste	4,900 tons/year
Water	615,000 gallons/day
Electricity	81,000 kilowatts
Air Quality	See Text.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	1,135 trips
A.M. Peak Hour, Out	750 trips
P.M. Peak Hour, In	1,660 trips
P.M. Peak Hour, Out	2,340 trips
Transit Person Trips	
A.M. Peak Hour, In	485 trips
A.M. Peak Hour, Out	610 trips
P.M. Peak Hour, In	930 trips
P.M. Peak Hour, Out	935 trips
Pedestrian Trips	810 trips
Parking Required by Zoning Ordinance	9,153 spaces
	(65.1 acres of surface area)

¹For south and west bound trips, assumes a modal split (auto/transit/walking) of 55/35/10 for residential uses, 80/10/10 for retail uses, 75/15/10 for office uses, and 85/10/5 for hotel uses. For north bound trips, assumes a modal split of 50/40/10 for residential uses, 80/10/10 for retail uses, 65/25/10 for office uses, and 85/10/5 for hotel uses.

In general it appears that public recreation areas in the northwest corner of the City are inadequate in terms of both acreage and facilities. The Park Center development now underway is planned to meet many of the residents' recreation needs on site. The development will provide swimming pools, tennis courts, and other facilities. Despite the extensive on-site facilities, however, there will remain an unmet need for playing fields. If the City were to maintain the current City-wide ratio of 4.0 acres of parks per 1,000 population, it would have to provide an additional 21.5 acres of open space as a result of development of the growth area. The Park Center development will have about 9.0 acres of park area in addition to its swimming pools, tennis courts and the like.

B. Environmental Impacts

1. Sewage: The development will add 572,000 gallons per day to the flow in the sewer trunk line which runs through the tract toward the Arlington Treatment Plant, which serves the extreme northwest part of the City. The line now has capacity to handle this increased flow, which will use 32 percent of Alexandria's remaining share of the capacity of the Arlington plant.

2. Water: The existing trunk line is adequate to handle the 615,000 additional gallons per day which the fully-developed Stone Tract will require. The regional water supply station is discussed in a subsequent section.

3. Solid Waste: The impact of the 4900 tons per year of solid waste is also discussed in a subsequent section.

4. Electricity: The likely development level will generate a demand for 81,000 additional kilowatts of electricity. This impact is discussed in a City-wide context in a subsequent section.

5. Air Quality: Because of existing heavy traffic volumes in the Shirley Highway corridor, roadside CO pollution already reaches high levels under "worst case" weather conditions in the P.M. rush hour. This corridor has the most critical pollution problem in the City, especially under congested conditions (20 mph) when roadside CO levels

at times exceed the national one-hour primary standard of 35 ppm. "Existing" pollution levels in the table below (Table 26) are based on present Shirley Highway P.M. rush hour volumes (about 9700 cars, both ways); "added" pollution is derived from the estimated 1500 cars from the developments which will use the segment of Shirley where it intersects King.

Table 26

CO Concentrations at Completion of Likely Development¹
Shirley - King St. Intersection
(in parts per million)

Emission Factor Year	20 mph Average Speed			40 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	40.7	6.3	47.0	22.3	3.5	25.8
1980	12.6	2.0	14.6	6.8	1.1	7.9
1985	5.8	.9	6.7	2.9	.5	3.4

¹ The estimated CO concentrations decline over the emission factor year because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worst case assumption (i.e., average vehicle emissions will not decline).

6. Noise: Heavy traffic along Shirley Highway may cause some disturbance to the developed site because there is no topographic buffer between Shirley and the areas to be developed. Phase I of Park Center may experience noise problems because it is close to Shirley Highway, and at places the buildings under construction are less than 150 feet from the edge of the road. A larger setback will be necessary to buffer adequately future sections of the development.

7. Storm Water: Development of the heavily wooded tract will decrease the soil's rainwater absorption capability and, by making the ground surface smoother, increase the speed of runoff within the watershed. To compensate for this impact, the developers will provide flood water retention on site (to slow the rate of flow) and will participate in needed improvements in the South Lucky Run Channel (half of which will be in culvert) as far as Walter Reed Drive. Beyond

Walter Reed Drive (in Arlington), there is a new channel which is adequate to carry the increased level of flow.

C. Transportation Impacts

1. Automobile Trips: The automobile traffic impacts of the development are evaluated in a subsequent section of the report where there is discussion of conditions on Shirley Highway, Route 7, Seminary, North Beauregard, and Braddock in the context of impacts from both the Stone and Winkler Growth areas. However, certain specific points can be made about road segments affected only or primarily by the Stone Tract.

(1) The major part of the outbound P.M. rush hour traffic (total of 2340 cars) will exit onto Route 7's eastbound lanes. Despite the planned widening of King to six lanes in this segment and the construction of the planned flyover at North Hampton, traffic congestion between the development's major entry point and Shirley Highway could be severe.

(2) Because almost 600 southbound trips will attempt to enter Shirley from Route 7, the capacity of the ramp serving this traffic may be exceeded, possible aggravating conditions in the segment of Route 7 just west of Shirley.

(3) Braddock Road will not receive a large share of traffic from the development; it appears that this road can handle the expected increases with some improvement of the N. Beauregard - Braddock signalization.

2. Transit Trips: The development will generate almost 1865 transit trips in the P.M. rush hour and 1095 in the A.M. rush hour. More bus trips (which must be provided at additional City expense) will therefore be needed to serve the Shirley corridor.

D. Fiscal Impacts

An estimated fiscal impact ratio of 2.16 (Table 27) places the Stone Tract relatively high among the growth areas, significantly below only the Dip Commercial area and North Waterfront, and approximately the same as Potomac

Center and Arlandria East. Although this growth area has large retail space and hotel use components (both of which generate large amounts of tax revenues relative to City service costs) in the likely development, the ratio is pulled down by the presence of a significant number of single-family units (with their high public school costs) and by inclusion of the cost of the North Hampton flyover at Route 7 on the expenditure side. The North Hampton flyover project is listed in the City's current capital improvements program.

Table 27

Stone Tract Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Townhouse Units (150)	245	245	0
Elevator Dwelling Units (3220)	2829	1341	+1488
Office Gross Floor Area (760,000 ϕ)	428	295	+ 133
Retail Gross Floor Area (470,000 ϕ)	672	69	+ 603
Hotel Units (330)	164	13	+ 151
Capital Costs	--	44	- 44
Totals	4338	2007	+2331
<u>Revenue/Expenditure Ratio: 2.16</u>			
Alternative Totals ¹	4338	1700	+2638

Alternative Revenue/Expenditure Ratio: 2.55

¹ Alternative calculations exclude existing debt service from expenditures.

Conclusions and Recommendations

The potential for growth in this area is already settled in part since Park Center, which is now being built and marketed, will occupy much of the site. The effects of this development are not yet clearly visible, but it is likely that they will be similar to those projected for the nearby

Winkler Tract. Development of both parcels will require substantial elimination of two of the few remaining large wooded areas in the West End, cause substantial increases in the City's population and work force, and aggravate already serious traffic problems on Shirley Highway, Route 7, Beauregard Street and Seminary Road. The traffic generated by the Stone Tract will be substantial and, in connection with traffic from Winkler, further development at Skyline Center (approximately one mile to the West), and other development in the region, will have a serious impact on these arteries and in addition may under certain conditions cause carbon monoxide standards to be exceeded during congested rush hour traffic conditions.

It is therefore essential that the City take whatever steps are available to discourage automobile traffic at this site (for instance, by use of bus lanes and by preferred bus access to the Shirley express corridor) and to channel traffic onto Shirley and away from local streets and arterials. The widening of King Street between the City limits and Shirley (but not beyond) will be necessary to give persons living or working in the area better access to Shirley and to prevent congestion on the Shirley ramp from interfering with through traffic on King.

The Stone Tract's development will add approximately 5400 persons to the City's population. It is probable that there will be little heterogeneity in this group, that it will include few children, and that most residents will be affluent. Park Center may become a self-contained community with little contact with or concern about the social and political life of Alexandria.

Steps should therefore be taken to integrate Park Center with nearby areas and to encourage interaction between it and the City. These steps should include easy pedestrian and bicycle access into and within Park Center, and a mix of residential unit sizes and prices (including some units within the reach of persons of moderate means, particularly the moderate-income elderly). A pedestrian overpass on the existing bridge should be constructed linking Park Center and the apartment complexes south of Shirley Highway in order to encourage walking to work.

The City should act to prevent the vacant land owned by the Stone Estate and the existing residential areas from

being developed in a way that will contribute more large dollops of traffic or which will aggravate the existing City-wide imbalance between numbers of renter and owner-occupied units. In the residential area in the northeast corner of the growth area, this aim can be accomplished by maintaining the present zoning or by refusing to increase the zoning beyond that which permits townhouses. As for the vacant areas (which straddle Braddock Road), the City should reduce the permissible heights and densities to prevent the emergence of another Park Center.

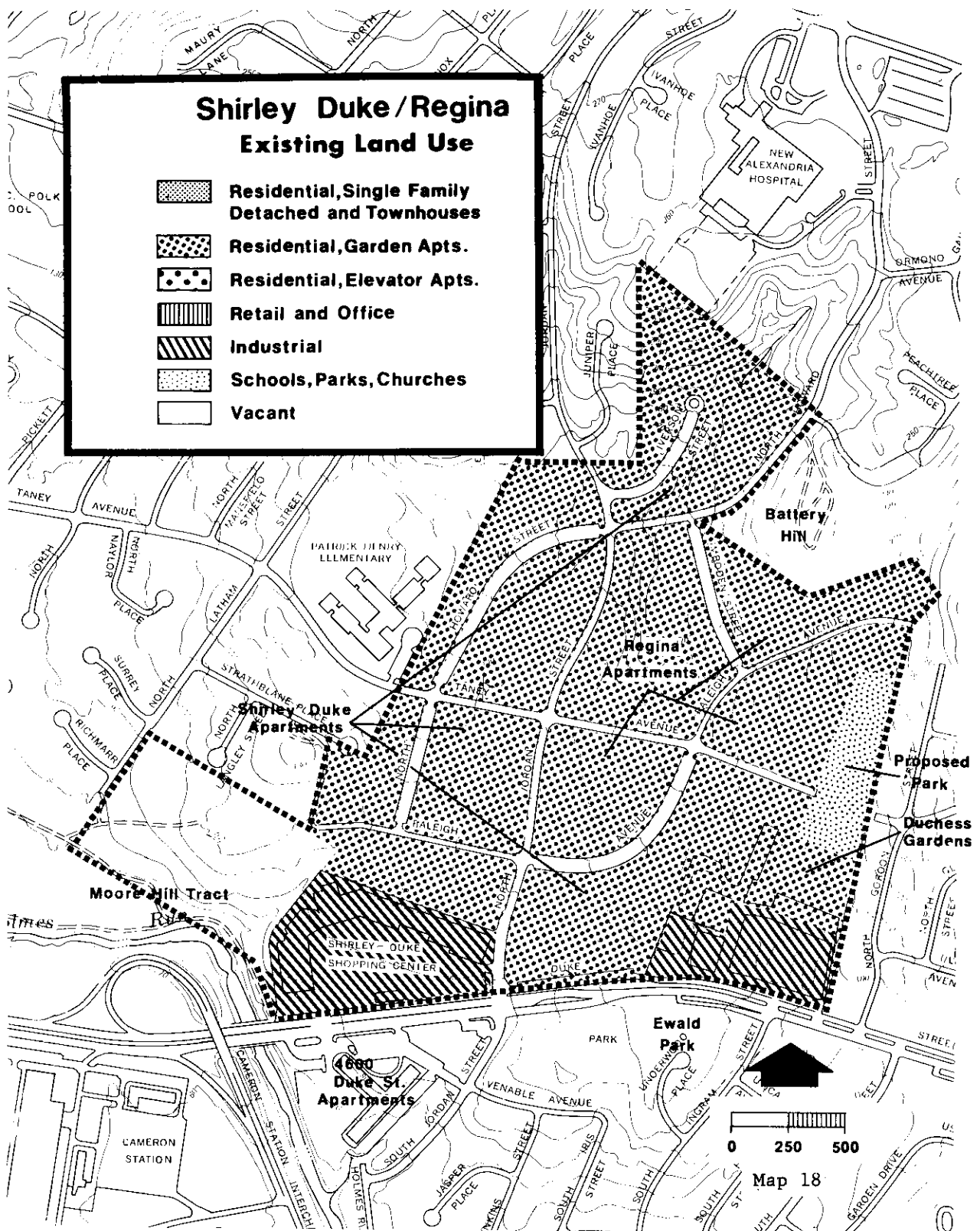
The City can help alleviate the effects of denuding this forested area by encouraging developers to leave as much of the area as possible in its natural state, to use the stream bed which bisects the site as a natural recreational area (which is planned), and to plant street trees liberally. The City should strengthen its landscaping ordinance to assure achievement of these goals in this and other areas. With respect to design, the City should require that building heights be scaled away from the periphery of the project and that all parking be concealed or in structures.

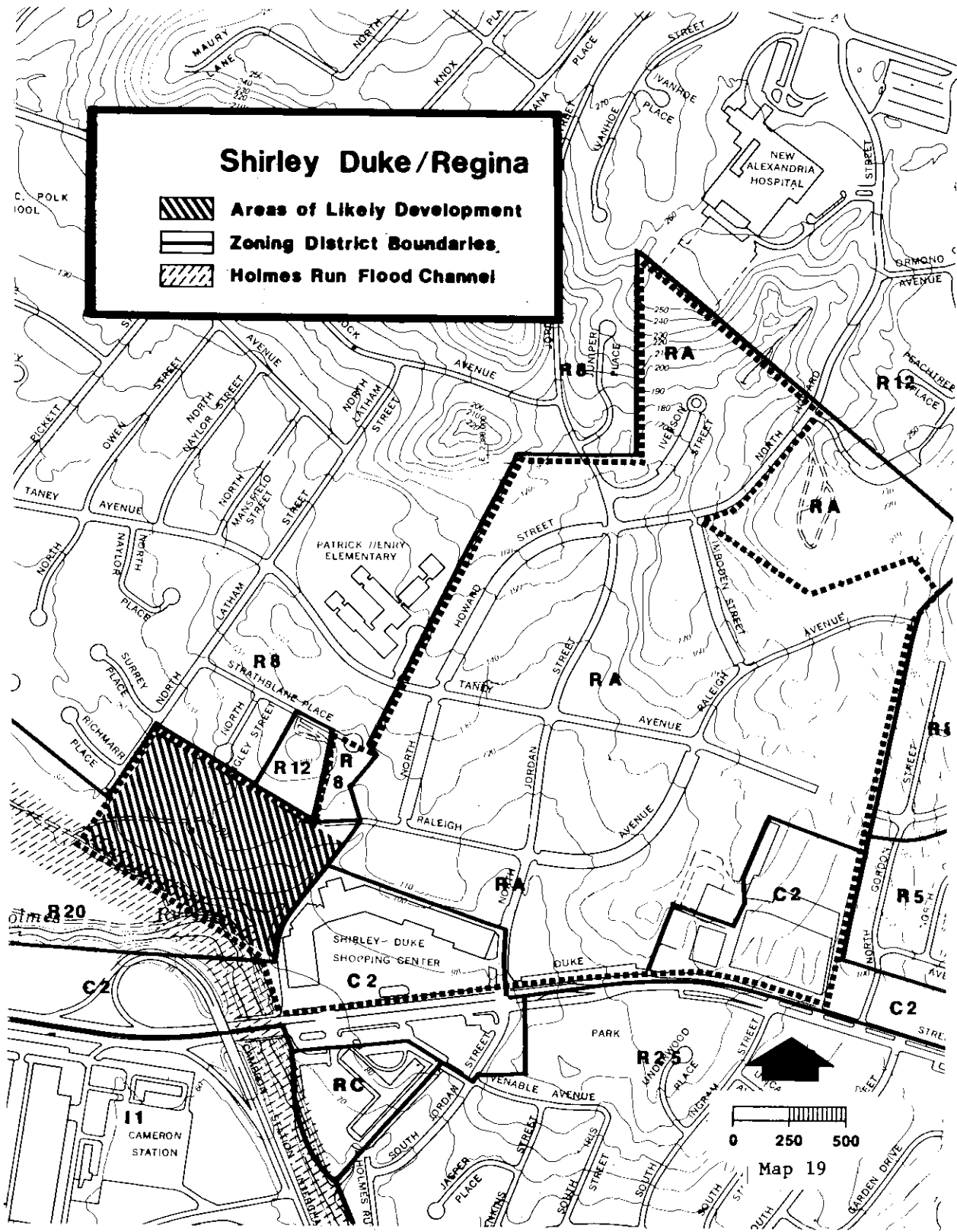
CHAPTER VI: SHIRLEY DUKE/REGINA

The Shirley Duke/Regina growth area consists of 134 acres north of Duke Street to the northeast of Cameron Station. The area is bounded by Duke Street and the center line of the realigned Holmes Run drainage channel on the south, the north-western edges of the Moore-Hill Tract and Shirley Duke Apartments on the west and north, and the eastern property lines of the Shirley Duke, Regina, and Duchess Gardens Apartments on the east. The predominant zones in the area are RA (approximately 89 acres mostly devoted to the 2118 garden apartment units of the Shirley Duke and Regina complex), C-2 (approximately 22 acres including the Shirley Duke Shopping Center and Duchess Gardens), and R-20 (approximately 14 acres of the Moore-Hill Tract). The character of the area is determined by the large number of low and moderate income garden apartments (2433 units in total), and the presence of a community-level shopping center (Table 28, Maps 18 and 19).

Table 28
Shirley Duke/Regina, Present Characteristics

Parcel	Parcel Size	Zoning	Land Use
Moore-Hill Tract	15.5 ac.	R-8, R-12 R-20	Vacant
Shirley Duke Apts.	51.2 ac.	RA	1300 gdn. apt. units
Regina Apts.	28.6 ac.	RA	719 gdn. apt. units
Duchess Gardens	8.9 ac.	C-2	305 gdn. apt. units
Shirley Duke Shopping Ctr.	10.5 ac.	C-2	410,000 / retail
Food Fair	1.9 ac.	C-2	19,000 / retail
Gas Station	.4 ac.	C-2	Gas Station
Baptist Church	2.6 ac.	RA	Church
Subdivided single-family lots	1.4 ac.	RA	6 single family d.u.'s
Right-of-way	14.5 ac.		Right-of-way
<u>Total</u>	133.7 ac.		





Because of the age and lack of maintenance, the low rentals, and the availability of apartments renting by the week, Shirley Duke and Regina Apartments have attracted mainly single persons and young families of low and moderate income. In particular, the weekly rentals have attracted a highly transient group of tenants who have contributed to the area's substantial social problems. While the existence of areas such as Shirley Duke/Regina with moderately priced apartments results in Alexandria's housing a wider range of income levels than surrounding jurisdictions, the on-set of blight and deterioration are cause for concern. At present the owners of the Shirley Duke and Regina Apartment complexes are considering alternative forms of rehabilitation and it appears that major rehabilitation can be financially feasible only if drastic structural changes are made in the buildings. Such rehabilitation would change the entire character of the neighborhood from low and moderate to middle income. Clearance and redevelopment are feasible only with an increase in density, and would have the same effect on the income characteristics as a major rehabilitation.

A small portion of the Moore-Hill Tract within the growth area is in the Holmes Run flood plain district restricted area. With the completion of the Holmes Run and Cameron Run Flood Control Projects in the late 1970's, this development constraint will be eliminated. The access and scenic easements which will parallel the realigned channel are adequate to allow construction of a walkway and bikeway along the north side of the channel, as called for in the Long Range Land Use Plan Map of the adopted Consolidated Master Plan. This map designates a ribbon of park and open space land from the Rolf Natural Area along Holmes Run to the point at which it flows into Cameron Run. The map also shows an open space corridor through the Moore-Hill Tract to the Patrick Henry School. In addition, the map identifies two new recreation and open space areas within the acreage covered by the Shirley Duke and Regina Apartments complex; if this area were cleared for recreation uses approximately sixteen garden apartment buildings (160 units) would have to be demolished. The Master Plan recommends medium-density residential uses in the Shirley Duke, Regina, and Duchess Gardens areas; commercial use in the Shirley Duke Shopping Center area; and low density residential uses for the portion of the Moore-Hill Tract on the north side of the proposed flood channel.

Likely Development

Residential redevelopment of the Shirley Duke/Regina complex would require, at a minimum, the doubling of the present density of 27 dwelling units an acre. If the Consolidated Master Plan's recommendation for continued medium density residential use in the growth area is followed, it is unlikely that the City would approve rezoning to higher density and, therefore, the owner could not achieve an acceptable return on investment through redevelopment. The vacant 15.5 acres of the Moore-Hill Tract is now under consideration for City acquisition for park use, but if this land is not acquired, it is likely that it will be developed with low to medium density residential uses. The very low densities allowed by the existing R20 zoning of most of the tract would probably not govern development of the tract because of the need for a transition of intermediate density residential use between the Shirley Duke Shopping Center and apartments on the east and low-density single-family areas to the west. Therefore, if the tract is not acquired, it is expected that about half of it will be developed under R8 zoning and about half under RT zoning, producing about 126 single-family dwelling units as the likely development level.

Impacts of the Likely Development¹

A. Demographic and Social Impacts

1. Population, Employment and Schools: Three hundred and fifteen residents and 64 public school children will be added to the City. Since no commercial development is likely, there will be no increase in employees in the City as a result of the likely development.

2. Parks and Recreation: At present there are two recreation centers serving the growth area, the Patrick Henry School playground and recreation center (adjacent to the Shirley Duke Apartments on the western edge of the growth area)

¹ These are the impacts which will result from development of the Moore-Hill Tract, if it is not acquired for park use. If the tract is acquired, no development is expected in the area and therefore there will be no impacts.

Table 29

Shirley Duke/Regina

Likely Development Impacts Summary

Impact Area	Magnitude of Impact
<u>Demographic and Social Impacts</u>	
Population	290 persons
Employment	0
Schools	
K-6	35 public school children
7-8	10 public school children
9-10	10 public school children
11-12	9 public school children
<u>Environmental Impacts</u>	
Sewage	25,000 gallons/day
Solid Waste	208 tons/year
Water	32,000 gallons/day
Electricity	3,025 kilowatts
Air Quality	Negligible
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	19 trips
A.M. Peak Hour, Out	62 trips
P.M. Peak Hour, In	83 trips
P.M. Peak Hour, Out	44 trips
Transit Person Trips	
A.M. Peak Hour, In	7 trips
A.M. Peak Hour, Out	21 trips
P.M. Peak Hour, In	28 trips
P.M. Peak Hour, Out	15 trips
Pedestrian Trips, P.M. Peak Hour	22 trips
Parking Required by Zoning Ordinance	126 spaces (.9 acres of surface area)

¹Assumes a modal split of 80% auto, 20% transit for residential uses.

with a playground, four basketball courts, a baseball diamond and playfield, and a gym; and Ewald Park (south of Duke Street and across from Shirley Duke Apartments) with a playground, swimming pool, two basketball courts, two tennis courts and a baseball diamond. These centers provide some neighborhood recreation facilities for the growth area. Eight and seven-tenths acres of the Moore-Hill Tract north of the proposed Holmes Run channel and outside of the growth area have been acquired by the City for passive recreation (1.9 of the 8.7 acres will eventually be required for the widened channel.), and the City is currently considering the acquisition of additional parts of the Tract. Because so few residents and school children will be added by likely development, there will be relatively little impact on the park and recreation facilities servicing the growth area. It should be noted that the existing facilities, especially those in Ewald Park, are being used to capacity.

B. Environmental Impacts

The likely development level of 126 additional single family homes will have negligible impact on the environmental quality of the growth area. Heavy traffic on Duke Street now degrades the air quality and generates substantial noise for residents living in the Shirley Duke and Duchess Gardens apartment units facing directly onto Duke Street.

C. Transportation Impacts

At present, North Jordan Street is near capacity where it intersects Duke Street. The likely development will generate 127 in and out auto trips in the P.M. peak hour. Only approximately half of these trips will pass through the North Jordan Street - Duke Street intersection, and these additional peak hour trips will not significantly affect the level of congestion at this intersection.

D. Fiscal Impacts

If the 15.5 acres of the Moore-Hill Tract is privately developed rather than acquired for park use, the approximate budgetary impact, once the development is completed, would be

as shown in Table 30. On the expenditure side, the figures include only estimated increases in operating costs resulting from the development; the small amount of development would not necessitate any capital projects.

Table 30

Shirley Duke/Regina Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Single family dwelling units (126)	206	197	9
Capital Costs	--	0	--
Totals	206	197	9
<u>Revenue/Expenditure Ratio: 1.05</u>			
Alternative Totals ¹	206	183	23

Alternative Revenue/Expenditure Ratio: 1.13

¹ Alternative calculations exclude existing debt service from expenditures.

The revenue/expenditure ratio is the lowest among the ten growth areas because all of the likely development would be single-family residential, which produces large numbers of school children (and accompanying high operating expenditures for schools). Inclusion of a fair share of debt service on the expenditure side leaves this growth area with a slightly above break-even ratio of 1.05.

Conclusions and Recommendations

The chance of significant redevelopment of the garden apartment complexes in this area appears to be remote under present conditions. It is not economically feasible for private interests to purchase, demolish, and replace these still profitable projects absent substantial direct subsidies or indirect subsidies by means of rezoning to permit higher densities. There is no lively prospect that government agencies will provide direct subsidies for redevelopment, and even

generous rezoning may not be sufficient to inspire new construction. There is a significant risk that these apartment projects will continue to deteriorate.

While deterioration of the apartment projects in this area confronts the City and adjacent neighborhoods with problems, replacement of these projects with high-rise buildings is not the solution. This area is a particularly inappropriate site for such development. It is far from Metro stops and interstate highways, the streets in the area are grossly inadequate to handle the traffic that a major development center would generate, and the surrounding neighborhoods of single family homes would be adversely affected. Furthermore, the wisdom of attempting to solve such problems as unkept buildings (a particular problem at the Regina Apartments) and a rising crime rate by encouraging higher density development is doubtful. The City should instead approach these problems directly by such actions as vigorous enforcement of the housing code, increased police protection, etc. Finally, redevelopment in all probability would result in the displacement of many existing residents who could not meet the significantly higher rent levels which would likely be applicable in new buildings.

In short, the area's present low profile should be maintained. The City should not view it as a potential development center and should not offer higher densities as an inducement to replace the existing projects. The City should take all practical steps to require maintenance and upgrading of Shirley Duke and Regina Apartments and, if the budget permits, to subsidize selective, phased rehabilitation of some of the buildings in those projects. These and similar actions might provide a more stable racial and economic balance in the area.

The north side of the Moore-Hill Tract, in the southwest portion of this area, is now undeveloped. If the City does not acquire this property for park use, the existing R-20 zoning should be changed. The eastern half of the tract should be rezoned R-8 and the western half be rezoned RT to encourage construction of townhouses and single family homes compatible with adjacent neighborhoods. Although development of the Moore-Hill Tract would not be sufficient by itself to require widening of streets in the area, existing problems at the Duke/Jordan and Jordan/Taney intersection

necessitate the extension of Raleigh Avenue to Duke Street along the west edge of the shopping center (part of the right-of-way for this purpose has already been dedicated).

As part of an effort to make this area a more attractive place to live, the City should provide a park (with mini-pool) on the west side of the Taney/Gordon intersection where Taney Avenue is broken. Also, the City should construct a bikeway and pedestrian path along the east bank of Holmes Run.

CHAPTER VII: ARLANDRIA EAST AND WEST

Arlandria East and Arlandria West are two adjacent growth areas in the north central part of the City along the boundary with Arlington County. Arlandria West, bounded by Glebe Road, Mt. Vernon Avenue, and the City boundary, encompasses about 95 acres of primarily RA-zoned land, except for a strip of C-2 commercial on the west side of Mt. Vernon. Arlandria East includes a total of 57.5 acres; about 21.0 acres are located within the commercially zoned strip east of Mt. Vernon Avenue and north of Glebe Road, and 36.5 acres are within the area bounded by Commonwealth Avenue, Reed Avenue, Route 1, and the Four Mile Run Flood Control Project. The tract adjacent to the Four Mile Run Flood Control Project is zoned predominantly I-2, I-1, and RD.

Land use characteristics of the two areas have some similarities, although Arlandria West is more completely built up. Housing in Arlandria West consists primarily of garden apartments built prior to 1950. Commercial uses, including some deteriorated structures, line Mt. Vernon. There are some industrial uses in the portion of Arlandria East adjacent to Route 1. Much of the housing stock in the area has not been well maintained (with notable exceptions, such as Presidential Gardens), probably because of flooding problems associated with Four Mile Run. Maps 20-23 and Table 31 show the present land use and zoning in these two areas.

Most of Arlandria lies within the Four Mile Run floodplain and therefore floods frequently. However, the Four Mile Run flood control project will reduce flood levels from 25 to 12 feet msl, effectively eliminating the flooding problem once the project is completed. With the exception of portions of Arlandria West where there are some moderate slopes, the land surface is flat, consisting in many sections of filled swampland. Soil conditions require special foundations for major construction.

Table 31

Arlandria East and West, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
<u>Arlandria East</u>				
Industrial	22.3 ¹	.03	Industrial	25.7
Commercial	15.0	.30 ²	I-1	7.9
Residential	7.6	.79	I-2	17.8
Single Fam.	3.9	.22	Commercial (C-2)	20.9
Garden Apt.	3.7	1.40	Residential	9.3
Public	1.0		RB	3.1
Vacant	10.0		RD	6.2
Right-of-way	1.6		Right-of-way	1.6
<u>Total</u>	57.5		<u>Total</u>	57.5
<u>Arlandria West</u>				
Commercial	15.9 ³	.15	Industrial (I-1)	13.2
Residential	50.6	.66	Commercial (C-2)	13.8
Single Fam.	10.2	.24	Residential (RA)	61.5
Garden Apt.	33.7	.86 ⁴	Right-of-way	6.5
Elevator Apt.	6.7	1.30 ⁵		
Public/Semi Public	10.0 ⁵			
Vacant	12.0			
Right-of-way	6.5			
<u>Total</u>	95.0		<u>Total</u>	95.0

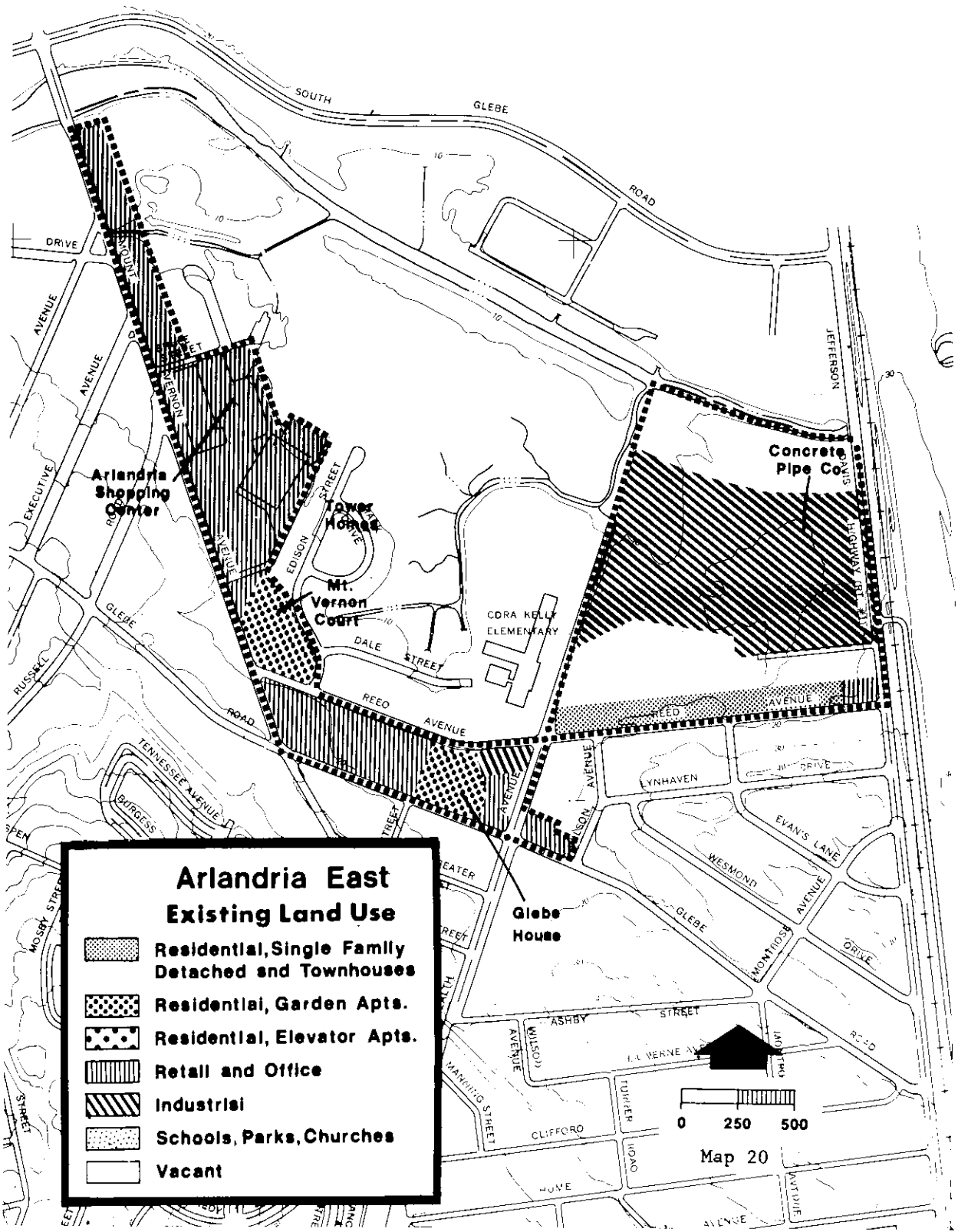
¹ The industrial acreage includes the land area formerly used as a materials storage area for the concrete pipe company.

² The commercial FAR is estimated. The Arlandria Shopping Center has an FAR of approximately .45.








³ Includes Vepco property.

⁴ FAR of elevator apartments was estimated based on 1,000 square feet gross floor area per unit.

⁵ Includes grounds of St. Rita's church and school, and City-owned area for Four Mile Run flood control project.

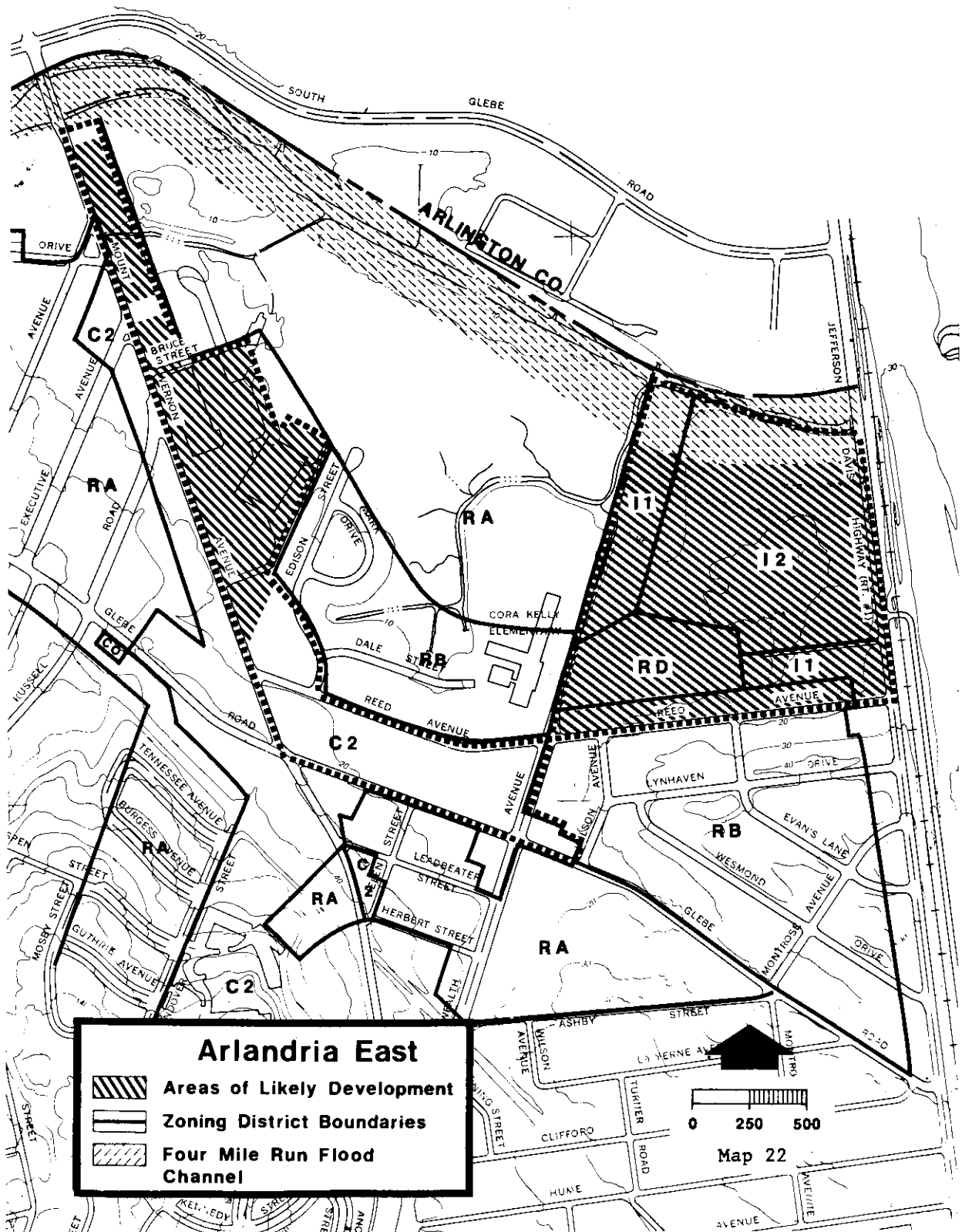


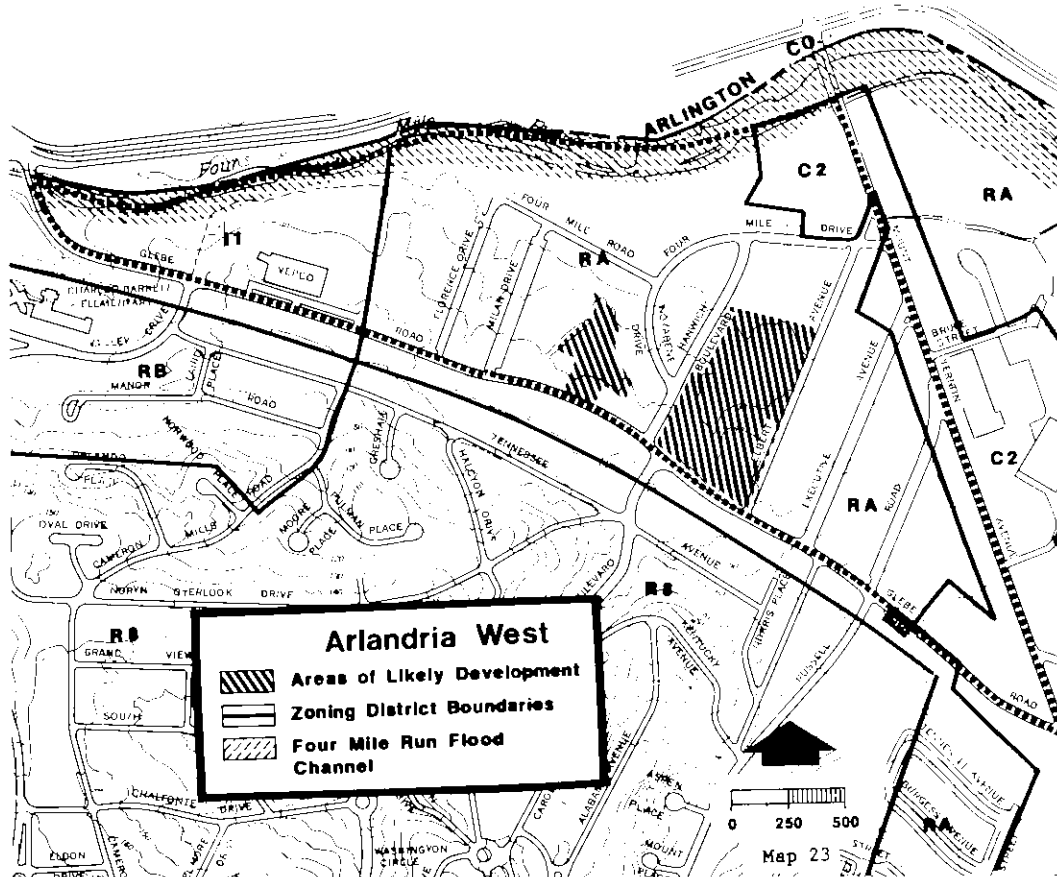
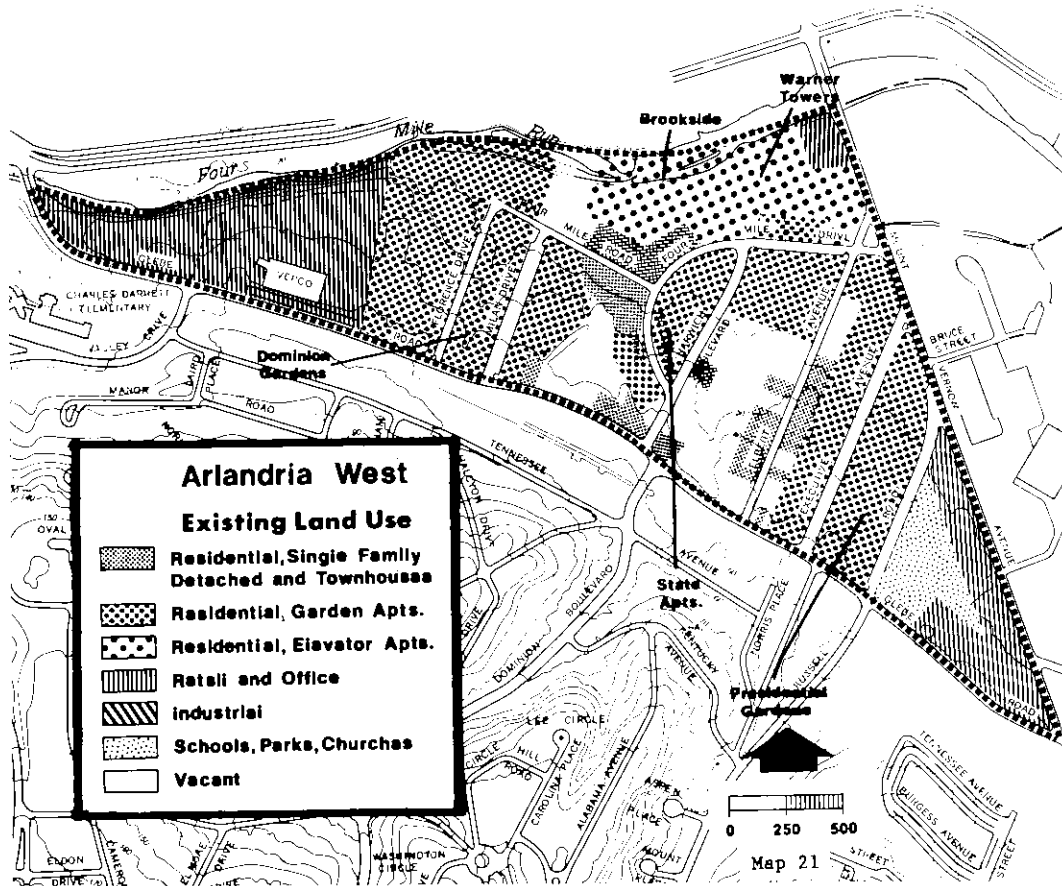
**Arlandria East
Existing Land Use**

-  Residential, Single Family Detached and Townhouses
-  Residential, Garden Apts.
-  Residential, Elevator Apts.
-  Retail and Office
-  Industrial
-  Schools, Parks, Churches
-  Vacant

0 250 500

Map 20





Likely Development

The proximity of these growth areas to major nearby employment centers to the north makes them prime candidates for development of vacant land and redevelopment of some of the older, deteriorated sections. The survey of Arlandria East revealed two major areas where significant new developments or redevelopments are likely. The first of these is the 36.5-acre area between Commonwealth and Route 1 north of Reed. Most of this area is in three landholdings, although there is a 4-acre strip of individually-owned single-family houses along Reed. The largest of the three properties is zoned for industrial use and therefore will require rezoning (probably to C0) if residential development is to occur. A portion of this property was taken for the flood channel, but the owner retained density allowance for the acreage taken. The other two large holdings consist of 12.5 acres, about half of which is zoned RD and the rest I-1 and I-2; existing zoning will govern development of these two properties, resulting in construction of 600 dwelling units and about 670,000 square feet of office and retail space. Increased land values and elimination of flooding are likely to generate redevelopment of the lots along Reed with low-rise, low-density development (about 4 acres).

The second area of likely development in Arlandria East is the 10.4-acre strip of commercial uses along Mt. Vernon Avenue north of Reed. Although this section contains several landholdings large enough for major redevelopment, assemblage of parcels will be required in places. Because the C-2 zoning permits high intensity development, no rezoning will be required for redevelopment of these properties. Much of this area is expected to be redeveloped for residential use, but neighborhood shopping facilities and some professional offices are also likely.

Because there is relatively little vacant land in Arlandria West, and because the condition of existing buildings is better, new development or redevelopment is expected to be limited to the major areas of vacant land (total of 12 acres). These areas will be developed at the 27 units per acre density permitted by the existing RA zoning.

The estimated total likely development (Table 32) consists of 40 townhouses, 2740 elevator dwelling units, and 960,000

2040 A
700± Low rise

square feet of office and retail uses in Arlandria East, and 320 garden apartments in Arlandria West. With the exception of the industrially-zoned properties east of Commonwealth, these levels of development assume that construction will occur at the maximum permitted intensities; an FAR of 2.5 is considered likely for the industrially zoned land. This level of development would involve construction of the equivalent of about twelve average size high-rise structures in the portion of Arlandria East adjacent to Route 1, several high-rise or mid-rise structures along Mt. Vernon, and perhaps 20 buildings housing garden apartments in Arlandria West. Most of the office structures in Arlandria East will be along Route 1, while the residential uses will tend to locate along the east sides of Commonwealth and Mt. Vernon. Construction of some portions of the likely development (especially on the vacant land in Arlandria East) will probably begin in the late 1970's, but activity in the redevelopment areas is not expected until the late 1980's.

Table 32

Arlandria East and West, Likely Development Summary

	Dwelling Units	Office Space (\pm GFA)	Retail Space (\pm GFA)
Arlandria East	2780	834,000	126,000
Arlandria West	320	0	0
Total Likely Development	3100	834,000	126,000

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The census tracts encompassing Arlandria East and West had relatively stable population between 1960 and 1970, while the larger area of Planning District II declined by 5.6 percent. The likely development will increase the Planning District's population by about 12 percent (5,100 persons) and will probably begin a trend for more persons from upper middle and upper income groups to reside

Table 33

Arlandria East and West

Likely Development Impacts Summary

Impact Area	Magnitude of Impact
<u>Demographic and Social Impacts</u>	
Population	5,100 persons
Employment	3,800 persons
Schools	
K-6	77 public school children
7-8	20 public school children
9-10	22 public school children
11-12	26 public school children
<u>Environmental Impacts</u>	
Sewage	444,000 gallons/day
Solid Waste	4,050 tons/year
Water	468,000 gallons/day
Electricity	59,000 kilowatts
Air Quality	See Text.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	1100 trips
A.M. Peak Hour, Out	720 trips
P.M. Peak Hour, In	1180 trips
P.M. Peak Hour, Out	1910 trips
Transit Person Trips	
A.M. Peak Hour, In	515 trips
A.M. Peak Hour, Out	455 trips
P.M. Peak Hour, In	660 trips
P.M. Peak Hour, Out	875 trips
Pedestrian Trips, P.M. Peak Hour	635 trips
Parking Required by Zoning Ordinance	6701 spaces
	(47.7 acres of surface area)

¹ For north bound trips, assumes modal splits (auto/transit/walking) of 50/40/10 for residential uses, 60/30/10 for office uses, and 80/10/10 for retail uses; for south and west bound trips, assumes modal splits of 70/20/10 for residential uses, 70/20/10 for office uses, and 80/10/10 for retail uses. Directional splits assumed are same as for Planning District I growth areas.

in the area, where the population has to date been dominated by persons of low to moderate incomes.

2. Employment: The likely development will increase the City's 1974 work force by 7 percent (3,800 persons). The development of 834,000 square feet of office space will create a significant employment center in an area which has previously been almost exclusively residential.

3. Schools: Elementary students from the Arlandria East and West areas would attend the paired Kelly and Tyler grade schools. The 77 additional elementary students can easily be absorbed by the excess capacities of these schools. The 68 additional students for upper grade schools will have a negligible impact.

4. Parks and Recreation: Arlandria East is well served by public recreation facilities. The 12-acre Cora Kelly school grounds, with playing fields, a playground, and basketball courts, are located between the two major areas of likely development. In addition, approximately 40 acres of City-owned land between Kelly School and Four Mile Run will provide for a variety of active and passive recreation opportunities; there will be picnic areas, a natural marshy area for nature study, a bike trail segment, playing fields, and tennis courts. Although there are no public recreation areas in Arlandria West, the presence of parks and facilities to the immediate east (Kelly School grounds and Four Mile Run Park) and to the southwest (Barrett School) indicates that residents of this growth area do have reasonable access to recreation opportunities. An additional 20.3 acres of recreation space would have to be provided (either by the developers or by the City) as a result of the likely development population growth, if the City is to maintain its current City-wide ratio of 4 acres of parks per 1,000 residents.

B. Environmental Impacts

1. Sewage: The likely development will add 444,000 gallons per day to the sewer interceptors which serve the area. The Arlandria interceptor does not have sufficient capacity to handle the increase in flow. Partly to accommodate expected new development, this line is now being replaced, with completion expected by 1980.

2. Water: The existing water mains serving the areas have the capability to handle the 468,000 gallons per day of water demand added by the likely developments. The regional water supply problem is discussed in other sections of the report.

3. Solid Waste: The impact of 4,040 additional tons per year of solid waste is evaluated in a subsequent section

4. Electricity: The developments will generate a demand for 59,500 kilowatts of electricity. This impact is also discussed in a subsequent section.

5. Air Quality: The likely development will have the greatest effect on the air quality in the segment of Route 1 between Reed Avenue and Arlington on which the major developments north of Reed will have their principal access points. It is estimated that approximately 50% of traffic generated by the developments will use the portion of this road segment between access points during the P.M. rush hour, thereby increasing roadside CO pollution levels as shown below (Table 34). "Existing" pollution levels in the table are based on present P.M. rush hour volumes (about 2200 cars, both ways); "added" pollution is derived from the estimated 1550 cars which will be added to this segment's traffic by the expected development.

Table 34

CO Concentrations at Completion of Likely Development:
Route 1 North of Reed Avenue
(in parts per million at P.M. rush hour)

Emission Factor Year	10 mph Average Speed			30 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	16.7	11.8	28.5	6.4	4.5	10.9
1980	5.3	3.7	9.0	2.0	1.4	3.4
1985	2.4	1.7	4.1	.9	.6	1.5

¹ The estimated CO concentrations decline over the emission factor years because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worst case assumption (i.e., average vehicle emissions will not decline).

Under "worst case" weather conditions, roadside CO concentration might reach as high as 28.5 ppm; this level of pollution is below the national one-hour primary standard (maximum which should occur not more than once per year) of 35 ppm.

6. Noise: With the exception of the part of Arlandria East adjacent to Route 1, the likely development areas will probably not experience substantial noise problems. The properties adjacent to Route 1 are large enough to permit the 300-foot setback which has been recommended by the Virginia Department of Highways. These growth areas are outside the aircraft noise corridor associated with National Airport.

7. Storm Water: The likely developments will cause increases in the amount of storm water runoff, but the improved Four Mile Run flood channel will offer more than adequate opportunities for discharge, making on-site retention undesirable.

C. Transportation Impacts

1. Automobile Trips: The likely developments will generate approximately 1820 A.M. peak hour trips, and 3090 P.M. peak hour trips. Much of this traffic will use Route 1. Evaluation of traffic conditions on Route 1, discussed in the context of impacts of this and other growth areas in this traffic corridor, is found in a subsequent section of the report.

Other traffic arteries which will be affected by the developments include Commonwealth, Glebe, and Reed; because of problems with signalization and in-out traffic along these streets, traffic is congested. Mt. Vernon has the most congested traffic conditions, which will probably be worsened by the likely development. Even with the improvements to Mt. Vernon scheduled in the City's capital improvement program, traffic will remain congested.

2. Transit Trips: Arlandria is now well served by bus routes providing access to Washington, the Alexandria CBD, and employment centers in Arlington. Although the growth areas are not within walking distance of the closest Metro

stations (Crystal City and National Airport stations), 970 A.M. rush hour transit trips and 1535 P.M. rush hour transit trips are estimated assuming a high level of transit service. Therefore, Metro will have to expand bus service to accommodate these added trips. Development of a shuttle bus system connecting the development areas with Metro stations in Arlington may be required.

D. Fiscal Impacts

Arlandria East and West, considered together, have a fiscal impact ratio of 2.03 (Table 35). However, Arlandria East has a high 2.19 ratio (below only Dip Commercial and North Waterfront, about the same as Potomac Center and the Stone Tract) because most of the residential development consists of elevator units and because there is substantial non-residential development. Arlandria West's low 1.13 ratio reflects the large number of public school children in garden apartments and the lack of non-residential uses in the likely development.

Table 35

Arlandria East and West Fiscal Impacts (thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Townhouse Units (40)	65	65	0
Garden Apartment Units (320)	284	251	33
Elevator Apartment Units (2740)	2408	1098	1310
Office Gross Floor Area (834,000 π)	469	194	275
Retail Gross Floor Area (126,000 π)	180	19	161
Capital Costs	--	52	- 52
Totals	3406	1679	1727
<u>Revenue/Expenditure Ratio: 2.03</u>			
Alternative Totals: ¹	3406	1392	2014
<u>Alternative Revenue/Expenditure Ratio: 2.45</u>			

¹ Alternative calculations exclude existing debt service from expenditures.

The expenditure side in the table reflects the annual cost of the following capital improvements which will probably be made necessary by the new developments: upgrade Four Mile Run interceptor (in Capital Improvements Program), widen Commonwealth Avenue north of Reed (not in C.I.P.), and widen Reed between Commonwealth and Route 1 (not in C.I.P.)

Conclusions and Recommendations

There has been virtually no development activity in Arlandria for over a decade, principally because of periodic flooding of Four Mile Run. Local residents and businessmen have also been reluctant to invest money in maintaining or upgrading their properties. As a consequence, existing structures have deteriorated, home ownership has decreased, and vacant land has remained undeveloped.

Completion of the flood control project on Four Mile Run should make it economically attractive for homeowners, commercial interests, and developers to begin new construction and to rehabilitate existing buildings. The City should encourage this process. To improve the overall character of the area, the City should promptly develop (and thereafter maintain) the park along Four Mile Run, should seek elimination of noxious odors from the Arlington Sewage Treatment Plant, and should require that developers preserve existing trees whenever possible.

Existing homes and apartments (with some few exceptions as noted below) should be rehabilitated rather than replaced. In some instances, the City or some other government agency may have to provide special encouragement to accomplish this end.

High rise development would not be appropriate except in a limited portion of this area. The principal arteries are already heavily travelled, and tall buildings would generally be out of place in the area's present low profile. High rise development in the commercial area on the east side of Mount Vernon Avenue or on the vacant parcel on the west side of Elbert Avenue would be particularly undesirable. The Mount Vernon Avenue commercial area should be maintained at approximately its present density, and the vacant land along

Elbert should be developed for townhouses and garden apartments.

The only site in the area where the City should encourage high-rise, dense development is on the industrially-zoned land between Commonwealth and Route 1. This site is relatively attractive for high-density development because developments at the northern edge of the City cause less traffic on interior City streets. If traffic from development at this site were directed to Route 1, there might not be a need to widen Reed Avenue, Glebe Road, or other streets in Arlandria, or to undertake other undesirable street "improvements". City Council's recommendation that Commonwealth Avenue end in a cul-de-sac below Four Mile Run should be observed.

Development at this site should not resemble the wall-like appearance of Crystal City. Varying building heights, imaginative design, easily accessible pedestrian walkways, and similar architectural techniques should help to avoid this problem. The development should contain a mix of uses with a predominance of residential.

Finally, many of the houses on the north side of Reed Avenue, east of Commonwealth, are beyond repair. These houses were constructed in the early 1940's, and their recent history is one of numerous sanitary and code violations. Redevelopment for townhouses would be a good use of this strip of land. However, appropriate steps should be taken to avoid placing hardships on existing residents. The City should prohibit new occupants from moving in (by acquisition, if necessary) when these structures become vacant.

CHAPTER VIII: DIP COMMERCIAL

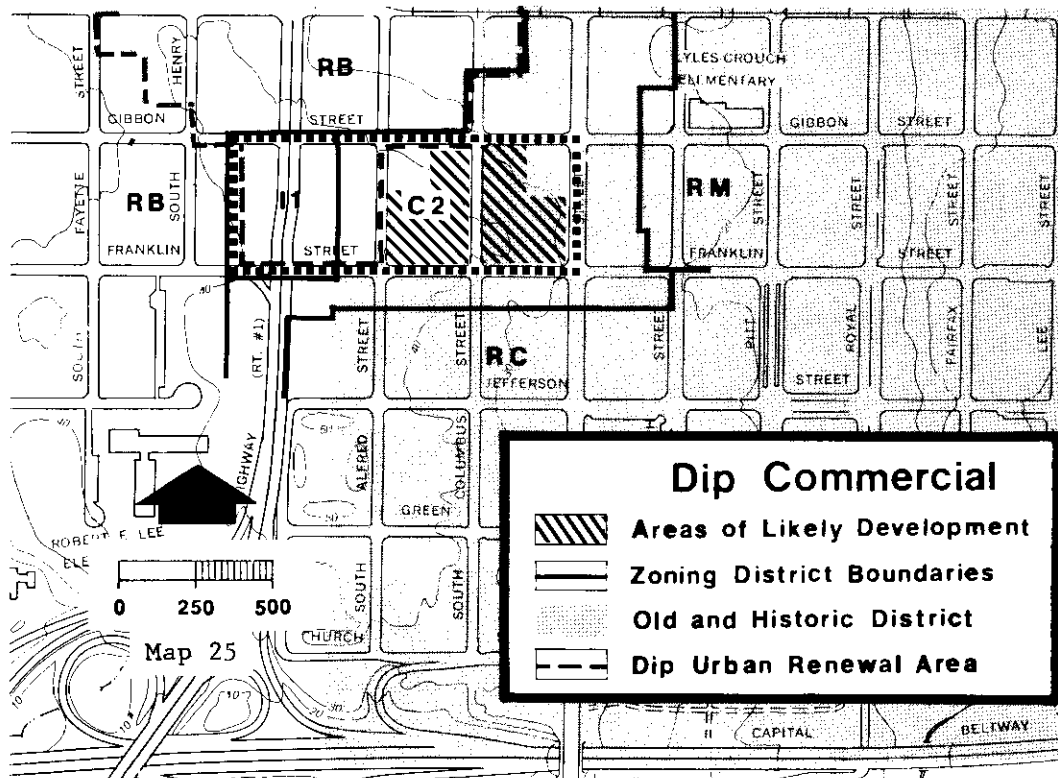
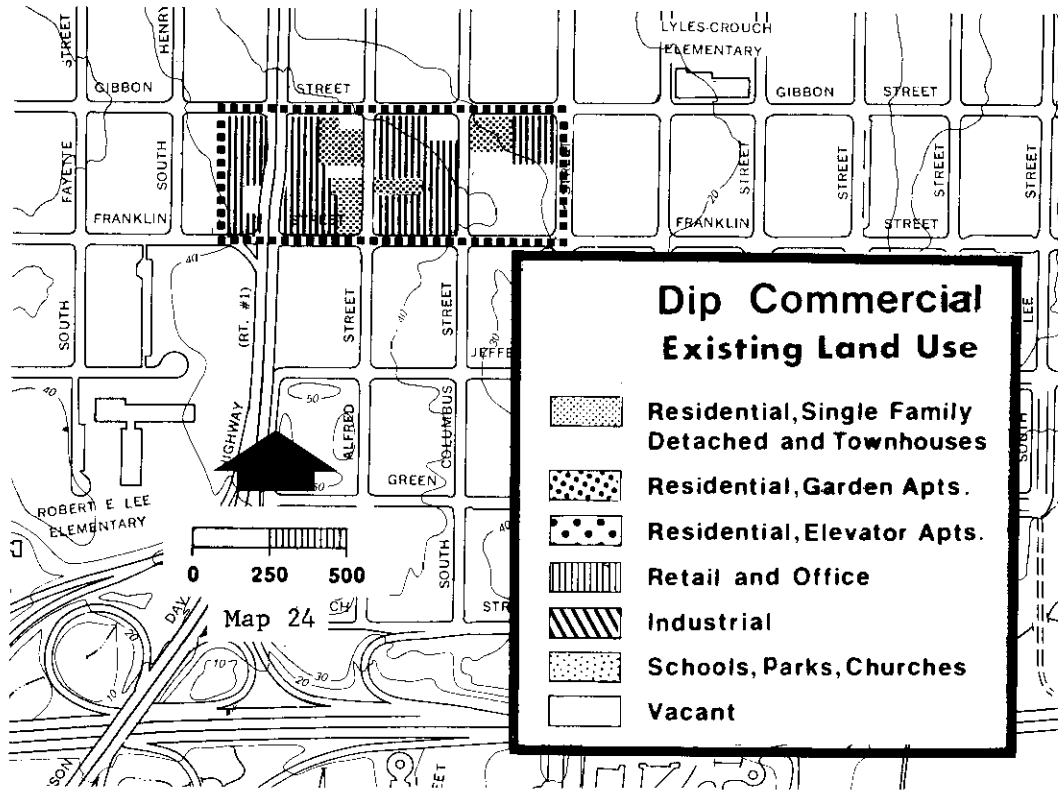
The Dip Commercial growth area consists of 7.0 acres encompassing approximately three and one-half city blocks on the west side of Washington Street between Gibbon and Franklin Streets. The western block and a half is part of the Dip Urban Renewal Project area and is designated for future commercial use in the urban renewal plan. The eastern-most two and one-half blocks are zoned C-2, while the two half blocks facing South Patrick are zoned I-1. The block which abuts Washington Street is part of the Old and Historic District.

Many of the parcels within the growth area are vacant, and with a few exceptions, those which are occupied have a mixture of marginal, low-intensity residential and commercial uses (Table 36, Map 24). Land ownership is currently fragmented, although a private effort to consolidate land-holdings has created several parcels large enough to allow major new developments. Surrounding land uses are similar to those in the growth area, although much of the area north of Gibbon has been purchased and cleared of structures by ARHA. As the general area (southwest part of Planning District I) re-develops in the future, most of it will probably remain residential. Any commercial and office development will tend to concentrate within the boundaries of the Dip Commercial growth area (Map 25).

Table 36

Dip Commercial, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Commercial	3.0	.39	Industrial (I-1)	1.8
Residential	1.4	.53	Commercial (C-2)	4.8
Vacant	2.8	0		
Right-of-way	.4	--	Right-of-way	.4
<u>Total</u>	7.0	.25	<u>Total</u>	7.0



This growth area's position at the southeast gateway to the City, adjacent to Old Town and with excellent access to both Route 1 and Washington Street, makes it an excellent location for commercial development, including offices and a hotel or motel. Residential redevelopment will be concentrated in the areas to the north of Gibbon. The likely development level (Table 37) includes a 425 room hotel on a major portion of the block adjacent to Washington (The land has already been partially assembled.) and an office building on the block between Columbus and Alfred. A major portion of the latter block will probably be developed at an F.A.R. of 3.0, resulting in about 188,000 square feet of office development. Construction of the hotel might begin within a few years, but development of the other block is not likely until the 1980's. Redevelopment within the next 20 years is not expected in the block and one-half on either side of Patrick. Timing and amount of development may be affected substantially by what happens in the Dip residential areas to the north.

Table 37

Dip Commercial, Likely Development Summary

<u>Type of Use</u>	<u>Level of Development</u>
Office space (square feet GFA)	188,000
Hotel (units)	425

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: Because no residential redevelopment is expected in this area, there will be no increase in the City's resident population as a result of development.

2. Employment: The likely development in this area will increase the City's work force by 1010 persons. About 20 percent of the jobs created will be service positions in the hotel portion of the development. Many employees for these positions will be drawn from the moderate income residential

Table 38

Dip Commercial

Likely Development Impacts Summary

<u>Impact Area</u>	<u>Magnitude of Impact</u>
<u>Demographic and Social Impacts</u>	
Population	0
Employment	1010 persons
Schools	0
<u>Environmental Impacts</u>	
Sewage	103,000 gallons/day
Solid Waste	650 tons/year
Water	108,000 gallons/day
Electricity	8,365 kilowatts
Air Quality	See text.
<u>Transportation Impacts¹</u>	
Automobile Trips	
A.M. Peak Hour, In	375 trips
A.M. Peak Hour, Out	125 trips
P.M. Peak Hour, In	150 trips
P.M. Peak Hour, Out	405 trips
Transit Person Trips	
A.M. Peak Hour, In	105 trips
A.M. Peak Hour, Out	45 trips
P.M. Peak Hour, In	55 trips
P.M. Peak Hour, Out	125 trips
Pedestrian Trips	33 trips
Parking Required by Zoning Ordinance	925 spaces (6.6 acres of surface area)

¹ For south and west bound trips, assumes a modal split (auto/transit/walking) of 80/15/5 for office uses, 85/10/5 for hotel or motel uses, 35/5/60 for retail uses. For northbound trips, assumes a modal split of 70/25/5 for office uses, 70/35/5 for hotel or motel uses, and 35/5/60 for retail uses.

neighborhoods to the west and north. The development will create a significant employment center which will complement the existing employment center with its focus in the lower King Street area.

3. Schools: No impact.

4. Parks and Recreation: Robert E. Lee School, adjacent to the growth area, has 10-acre grounds developed with a playground, basketball and tennis courts, playing fields, and a picnic area. Employees of the developed area will therefore have ready access to adequate recreation facilities for use during lunch periods or after work.

B. Environmental Impacts

1. Sanitary Sewers: The completed likely development will add 103,000 gallons per day to the flow in existing lines. The combined sanitary-storm sewer system in this area is in poor condition and will have to be upgraded at the expense of the developers. Separation of the storm and sanitary systems is required in the part of the growth area within the Dip urban renewal area.

2. Water: The new development's estimated daily demand for water will be 108,000 gallons. Major trunk lines on Route 1 and Washington Street can supply this increased demand. A subsequent section of the report evaluates the regional water supply situation.

3. Solid Waste: The likely developments will generate 650 tons of solid waste per year.

4. Electricity: The development of the area at the estimated likely intensity will cause an increase of 8,600 kilowatts in the demand for electricity.

5. Air Quality: Because of the relatively small size of this growth area, its development is not expected to cause any serious degradation of air quality. The analysis of "worst case" air pollution impact of the likely development focuses on the Patrick - Gibbon intersection, a point of heavy existing traffic which will be used by much of the traffic leaving the developments in the P.M. rush hour.

Under the most unfavorable meteorological conditions, CO pollution levels (in parts per million) at roadside of the intersection will be as shown in the table below (Table 39), indicating that the likely development will increase pollution by only 15 percent, and that total pollution will be less than the national primary standard for a one-hour period. "Existing" pollution levels are based on the present traffic volumes on Patrick (2750 cars, both directions) while "added" pollution levels are calculated from the amount of traffic passing through the intersection outbound from the expected new developments (400 cars).

Table 39

CO Concentrations at Completion of Likely¹ Development:
Gibbon - Patrick Intersection
(in parts per million at P.M. rush hour)

Emission Factor Year	10 mph Average Speed			30 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	20.9	3.1	24.0	8.0	1.2	9.2
1980	6.6	1.0	7.6	2.5	.4	2.9
1985	3.0	.4	3.4	1.1	.2	1.3

¹

The estimated CO concentrations decline over the emission factor years because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worst case assumption (i.e., average vehicle emissions will not decline).

6. Noise: The Dip Commercial growth area is between Route 1 and Washington Street, and will be subjected to substantial traffic noise from each of them. Structures will require construction design and materials necessary to prevent excessive noise disturbance to office employees and hotel guests.

C. Transportation Impacts

1. Automobile Trips: The greatest traffic impact of the development will occur during the P.M. rush hour when 405 automobile trips will be leaving the developed area. Most

of this traffic will be going south, and most of it will use Gibbon (which with Franklin forms a one-way pair) to enter Patrick southbound. There is some question whether signalization of this intersection can be designed to accommodate this level of traffic without causing additional problems on Route 1. Traffic already backs up during the rush hour at the Gibbon-Patrick intersection, and this congestion could create serious problems for traffic leaving the redeveloped blocks and trying to get onto Patrick via Gibbon.

The Dip Commercial area's addition to the overall traffic problem in the Route 1 - Washington Parkway corridor is evaluated (in conjunction with the traffic contributed by other areas) in a subsequent section.

2. Transit Person Trips: Development of the area will create about 145 transit trips in the evening rush hour. The level of transit usage could be increased somewhat if the area were connected with the mini-transit system proposed for the downtown area.

D. Fiscal Impacts

Because there are only non-residential land uses in this growth area and because the hotel accounts for over half of the likely development, Dip Commercial has the most favorable estimated fiscal impact ratio of all the areas (Table 40).

Table 40

Dip Commercial Fiscal Impacts (thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Office Gross Floor Area (188,000 sq)	106	40	66
Hotel Units (425)	211	27	184
Capital Costs	---	17	- 17
Totals	317	84	233
Revenue/Expenditure Ratio: 3.77			
Alternate Totals	317	73	244
Alternative Revenue/Expenditure Ratio: 4.34			

¹Alternative calculations exclude debt service from expenditures.

The only foreseeable capital costs attributable to the area's development are undergrounding of utilities and streetscaping, projects which are already included in the City's Capital Improvement Program.

Conclusions and Recommendations

In comparison to other areas studied, this tract is relatively small and does not offer potential for large-scale development. It is, nonetheless, important since it is in an area that the City is attempting to upgrade, and attractively designed development would benefit surrounding neighborhoods.

The permissible densities on this site (even with the height limits) would result in greatly increased traffic on the Franklin-Gibbon one-way pair, one of the City's busiest connector systems. Therefore, developers in this area should be encouraged to provide access to their projects in such a way as to permit rapid turning movements to and from adjacent arteries. Although the access problem may be difficult to resolve in view of congested conditions such as those at the Gibbon-Patrick intersection in the P.M. rush hour, the City should not widen streets as a solution to the problem, because such a solution could have detrimental effects on nearby residential areas.

Development in this area must also be designed in a manner compatible with the Old and Historic District, enhancing the southern "gateway" to the City. In no event should the City increase existing height limits in the area, and it should reduce substantially the limit of 150 feet which applies to portions of the tract. The densities associated with high-rise buildings are inappropriate for this site because they would generate too much traffic for existing streets. Mid-rise structures would provide both adequate density to the developer and an appropriate emphasis at the gateway.

Because of the small size of this tract, developers may have difficulty complying with the City's parking ordinance. The City should take prompt and firm action to

to prohibit large open air parking lots, or even worse, above-ground unscreened parking garages. These would be unsightly and jarring to travelers and residents, and would be wholly incompatible with Old Town. For similar reasons, the City should prohibit large neon signs and other external gimcracks. Conversely, the City should require street trees and other plantings so that the developments will blend with their surroundings.

CHAPTER IX: KING STREET STATION

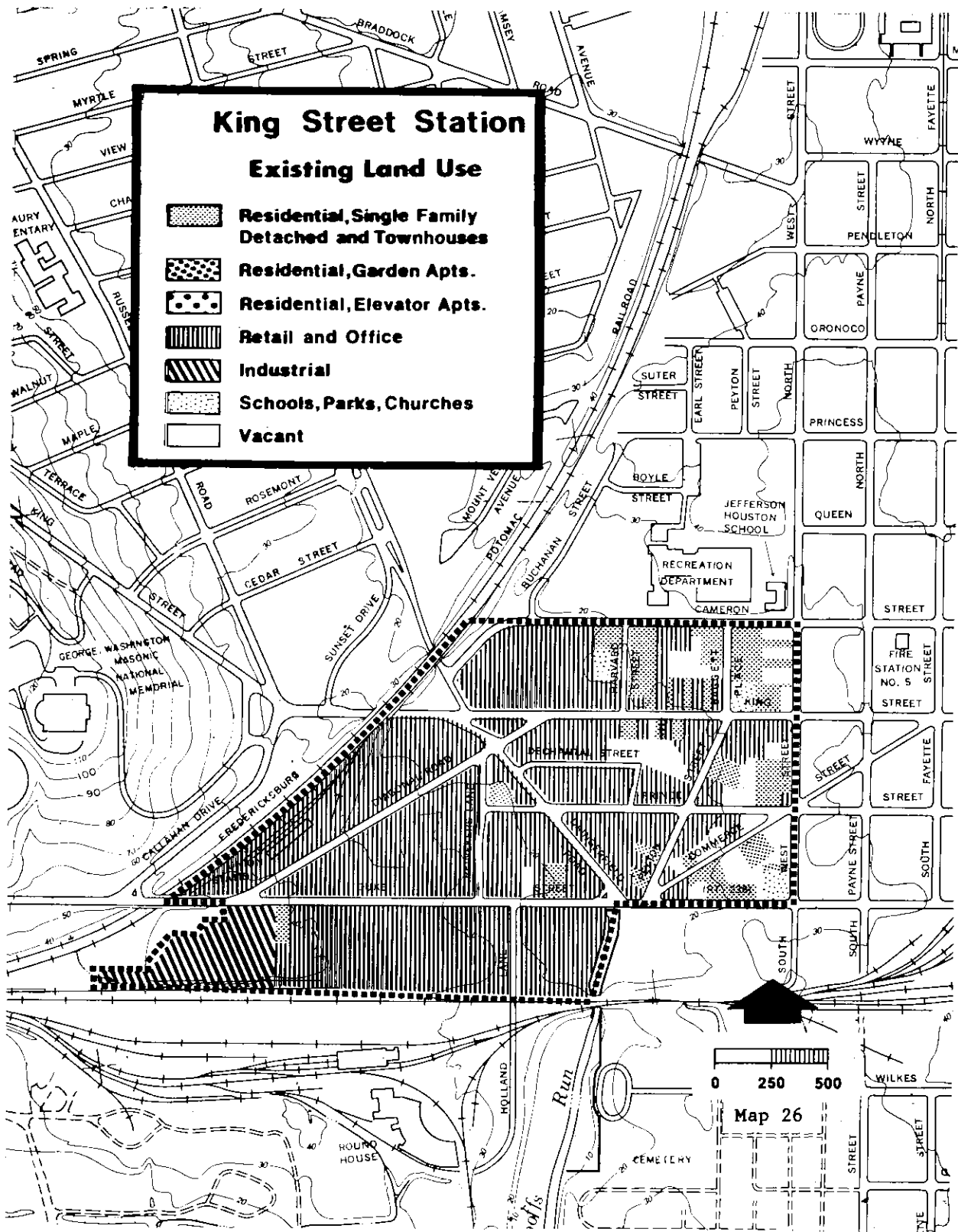
The King Street Station growth area encompasses approximately 72 acres which will have redevelopment potential after the establishment of the planned Metro station just south of the intersection of King Street and Daingerfield Road. This growth area is bounded by the RF&P rail line on the west; Cameron Street on the north; West Street on the east; and Duke Street, Hooff's Run, and the rail yards to the south. Existing land uses in the area (Map 26) are a mixture of low-density commercial and industrial uses within zoning districts which allow very high intensity development (Table 41). There are also a few areas devoted to residential use, found mainly east of Peyton Street and Baggett Place. There is extensive C-3 zoning (29.2 acres total) in the area north of Duke. Industrial zoning, mainly I-1, occupies another 20 acres, most of it south of Duke. The remainder of the area not used for street right-of-way is in RB or RD zoning (Map 27). Land holdings are fragmented and will require consolidation efforts if redevelopment is to occur on a significant scale.

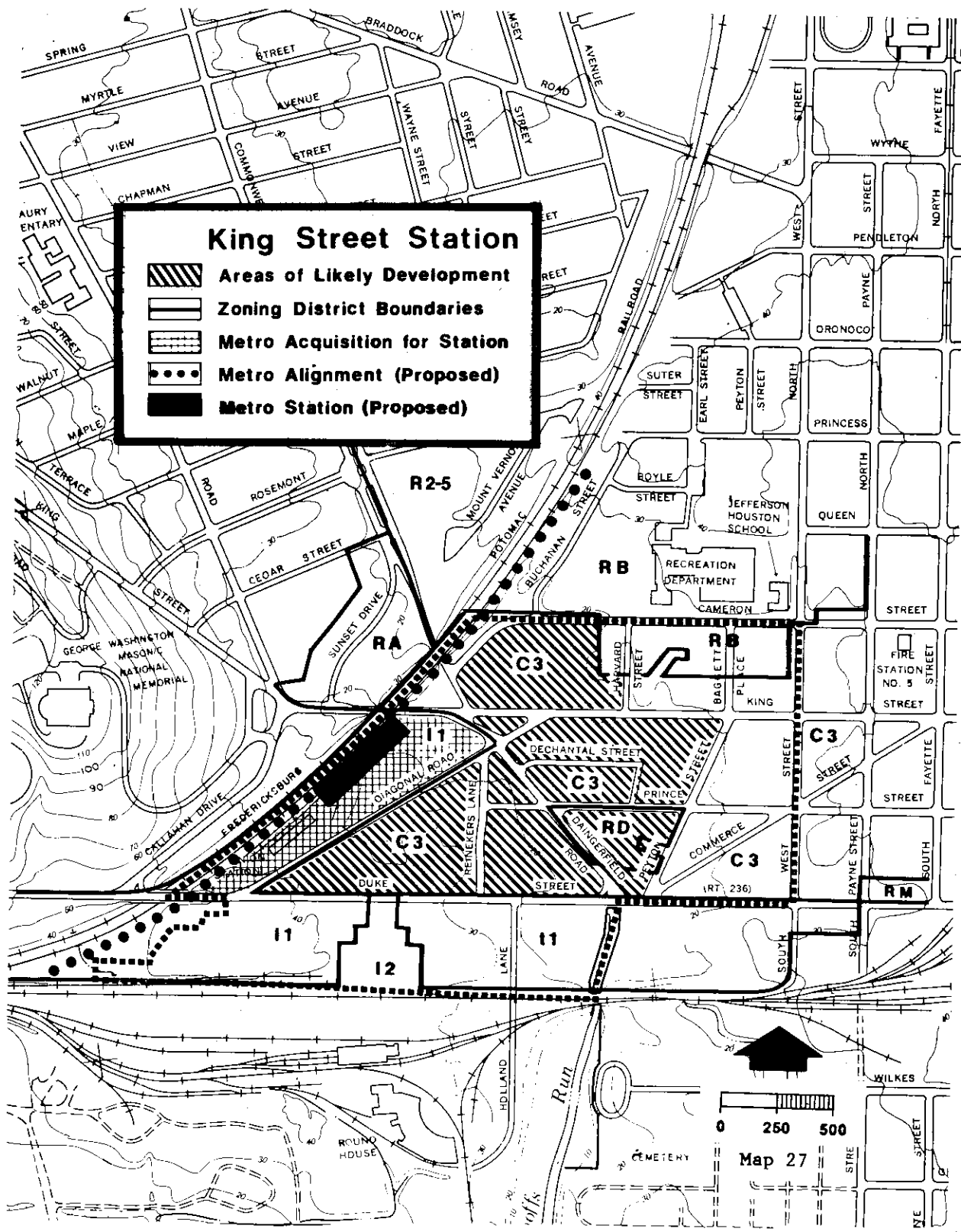
Table 41

King Street Station, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Industrial	5.9	.56	Industrial	20.2
Commercial	25.5	.34	I-1	17.2
Auto-related*	13.4	--	I-2	3.0
Residential	7.3	.25	Commercial (all C-3)	29.2
Station Site	7.0	--	Residential	4.6
Other	.8	.50	RB	3.3
Vacant	7.5	--	RD	1.3
Right-of-way	18.2		Right-of-way	18.2
<u>Total</u>	72.2		<u>Total</u>	72.2

*Includes auto sales, garages, body shops, tire stores, auto parts shop, repair shop, parking lots, gas stations, and other related uses.





The chaotic street system within this growth area occupies an unusually high proportion of its total land area. About 25 percent of the total acreage is in street rights-of-way, and if the acreage south of Duke is excluded from the total, the proportion in streets rises to 31 percent. Particularly in the area between Duke Street and King Street, the street system could be a major constraint on redevelopment efforts. The natural environment does not offer any significant constraints. Although the characteristics of the alluvial soils require consideration, unusual construction measures are generally not required. The land surface is gently sloping, and flooding affects only a narrow area along Hooff's Run.

Likely Development

A consultant recently evaluated development potentials of the King Street Station growth area and other areas surrounding proposed stations within Alexandria. As in the case of the Braddock Road Station area, the amount of development at King Street Station will depend in major part on whether the City encourages the redevelopment possibilities. In this area, assistance in the form of reorganization of the street system (including closures of some streets) and the promotion of land assemblage will probably be required to support substantial redevelopment. Without this assistance, development might be limited to commercial redevelopment similar to what is now in the area (though perhaps at a slightly higher intensity) and to one or more intensive, major new developments on the existing larger parcels. Likely development, which assumes public assistance as noted above, includes 1180 dwelling units (1,000 high-rise, 180 townhouses), *ok dunton* 300,000 square feet of office space, and 75,000 square feet of retail space. The inclusion of 180 townhouse units assumes that the City would encourage their provision to promote a variety of housing types and visual relief. Significant redevelopment in this area will probably not begin until the early 1980's.

The likely development would require approximately 30 to 40 acres, or almost half of the total growth area. The 1,000 high-rise units would probably be housed in five structures, while the 375,000 square feet of commercial uses would require two or three structures. Relocation of Route 1 through the area would change redevelopment possibilities by

removing prime sites from the likely development area.

Table 42

King Street Station, Likely Development Summary

<u>Type of Use</u>	<u>Level of Development</u>
Dwelling Units	1180
Office Space (square feet GFA)	300,000
Retail Space (square feet GFA)	75,000

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The 1180 dwelling units in the likely development will add about 2,000 persons from middle and upper income groups to the City's population. The resulting 9 percent increase in Planning District I's population (over 1974 levels) will help produce a more balanced distribution of income groups in the western part of the Planning District.

2. Employment: Of the 1425 persons added to the City's work force, 1275 will be office employees and 150 retail employees. The developments will create a significant employment center to complement the existing center in the lower King area and the expected centers in the North Water-front and Dip Commercial growth areas.

3. Schools: The 124 public school children generated by the developments will easily be absorbed by excess capacities of schools serving the area.

4. Parks and Recreation: Park and recreation areas near the growth area include the Cameron Street Center - Jefferson Houston School complex, with basketball and tennis courts, play equipment, and a large pool, and the paved recreation area at the southwest corner of Fayette and Queen, which has a lighted basketball court and play equipment. Persons from nearby neighborhoods use these facilities heavily, and although the facilities will be readily accessible to the growth area's residents, some additional recreation opportunities will be needed. The population increase will

Table 43

King Street Station

Likely Development Impacts Summary

<u>Impact Area</u>	<u>Magnitude of Impact</u>
<u>Demographic and Social Impacts</u>	
Population	2000 persons
Employment	1425 persons
Schools	
K-6	64 public school children
7-8	19 public school children
9-10	20 public school children
11-12	21 public school children
<u>Environmental Impacts.</u>	
Sewage	181,000 gallons/day
Solid Waste	1,650 tons/year
Water	197,000 gallons/day
Electricity	25,000 kilowatts
Air Quality	No major problem point.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	380 trips
A.M. Peak Hour, Out	230 trips
P.M. Peak Hour, In	425 trips
P.M. Peak Hour, Out	700 trips
Transit Person Trips	
A.M. Peak Hour, In	230 trips
A.M. Peak Hour, Out	275 trips
P.M. Peak Hour, In	390 trips
P.M. Peak Hour, Out	410 trips
Pedestrian Trips	260 trips
Parking Required by Zoning Ordinance	2481 spaces (17.7 acres of surface area)

¹ For south and west bound trips, assumes a modal split (auto/transit/walking) of 70/20/10 for office uses, 80/10/10 for retail uses, 50/40/40 for residential uses. For north bound trips, assumes a modal split of 55/35/10 for office uses, 80/10/10 for retail uses, and 40/50/10 for residential uses.

require that the City or developers provide 8.0 acres of open space if the existing City-wide level of provision of open space and recreation opportunities is to be maintained.

B. Environmental Impacts

Environmental impacts of the likely developments in this growth area are not expected to cause any problems. The existing water mains and sewer trunk lines can accommodate the added 197,000 gallons per day of water and 181,000 gallons per day of sewage generated by the development. Solid waste impact of 1650 tons per year, and electrical demand of 25,000 kilowatts, are evaluated in a subsequent section. Because traffic generated by the development will be well dispersed over several streets, it will not produce a significant increase in air pollution at any one point. Also, the full maximum likely development is not likely to be completed until the late 1980's (at the earliest), when the mix of automobiles will be producing much less pollution.

Noise disturbances to the area could be serious because of the traffic volumes on King Street and Duke Street, and because of noise from the Metro and rail lines. However, because setbacks and buffers will have only a limited effect on reduction of noise in this area (due to small parcel sizes), developers must use design, orientation, and sound insulation of structures to minimize the noise problem.

Storm water will drain into Hooff's Run; because there is only a short distance from the growth area to the outlet at Cameron Run, floodwater retention on site will not be necessary.

C. Transportation Impacts

1. Automobile Trips: The trips generated by the development will be primarily south and west-oriented for the office portions and primarily north-oriented for the residential portions. The traffic will be well dispersed over a number of alternate routes into and from the growth area, but because traffic in the area is already congested, the added traffic will not be insignificant.

King Street is particularly congested at its intersection with Russell Road. The congestion at this point is primarily attributable to commuter traffic to and from other parts of Planning District I, although the expected office space in the growth area will contribute to the problem.

Significant traffic problems in the area will arise from conflicts between the station-oriented traffic and existing commuter traffic. The combined effect of these two might be to create more severe congestion at several points within the area. The internal circulation is now under consideration in other City studies, which are being conducted by the Department of Transportation and Environmental Services and by the Department of Planning and Community Development.

2. Transit Trips: Totals of 505 A.M. rush hour and 800 P.M. rush hour transit trips are based on generous assumptions of extensive transit use because of the presence of the Metro station. All the projected riders will be able to walk to the station.

D. Fiscal Impacts

The budgetary impact of the likely development (as of the first year after completion - in 1975 dollars) may be approximated from fiscal impact factors. Application of the factors to the likely development levels indicates that development of this area will have a favorable impact on the City's budget (Table 44). Included on the expenditure side are two capital improvements attributable in some degree to the growth expected in the area. These two capital projects - improvements to Duke Street between Roberts Lane and Diagonal Road, and intersection improvements at the King Street - Russell Road juncture - are both in the City's current five-year capital improvements program. Because additional capital projects might be required in the future to serve the new developments in this area, the expenditure impact figures may be somewhat on the low side. The King Street Station area's 1.74 revenue/cost ratio is lower than the ratios for most of the other areas. This area ranks above only Arlandria West and Shirley-Duke/Regina (which are single-family and garden apartment residential, respectively, and therefore have large costs associated with

Table 44

King Street Station Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Townhouse Units (180)	294	300	- 6
Elevator Dwelling Units (1,000)	879	430	449
Office Gross Floor Area (300,000)	169	71	98
Retail Gross Floor Area (75,000)	107	11	96
Capital Costs	---	22	- 22
Totals	1449	834	615
<u>Revenue/Expenditure Ratio: 1.74</u>			
Alternative totals: ¹	1449	722	727
<u>Alternative Revenue/Expenditure Ratio: 2.01</u>			

¹ Alternative calculations exclude debt service from expenditures.

the numerous school age children) and slightly below the other growth areas where a large amount of development is expected. The King Street Station's relatively low ranking results from its significant amount of single-family residential (which has the lowest fiscal impact ratio among the land use types), and its higher than average transit ridership (with resultant larger Metro operating deficits on the expenditure side). Use of the current Metrobus operating deficit of 27¢ per rider to estimate future rapid rail operating deficits is, however, a speculative approach which may seriously over- or understate the actual future deficit. It is important to remember that the construction of a rapid rail system for the metropolitan area entails a large capital cost which can be justified by substantial ridership. In any event, however, the higher Metro operating deficit is a desirable trade-off in return for reduced automobile traffic.

Conclusions and Recommendations

The prospect of a major Metro station at King Street has made the area east of Union Station very attractive for development. Private interests have already begun assembling sizeable tracts, and development in this area could begin by 1980.

There has been little construction activity or new investment in this area for a number of years, and much of the area has acquired a run-down appearance. Metro-inspired development could reverse this unfortunate trend, and if the new development is well-conceived, it could lead to the regeneration of the upper King Street area. In addition, location of new residential and commercial centers in the city near Metro stations will help reduce traffic impact in the established neighborhoods and will help increase use of rapid transit.

To encourage private development and to accommodate traffic to the Metro station, the City must bring some order to the street system in this area and reduce the proportion of land area devoted to streets. The City should widen the King Street underpass to improve east-west traffic flow (although widening King Street itself west of Russell Road is not recommended), but it should not undertake any improvements which would encourage north-south commuter traffic through the area. In particular, Russell Road and Commonwealth Avenue should not be widened or otherwise altered to accommodate additional traffic.

While some development is desirable for this area, any new construction must be generally compatible with the area's existing low-profile character and not be so dense that it seriously affects nearby residential areas. If the City would prefer large-scale planned development rather than a parcel-by-parcel approach, it may need to assist in the process of assembling large tracts. While a few well-designed high rise buildings may be appropriate, they should be of varying heights, should in no event exceed existing height limits, and should be separated by open space, townhouses and other low rise development in order to avoid resembling Crystal City. To protect views to and from the Masonic Temple, the City should encourage placement of any tall buildings on the Duke Street side of the area; it should explore the need for a new ordinance to achieve this end.

It is vitally important that new construction in this area be more than 50 percent residential and to the extent possible existing residential properties be protected and improved. Residential rather than office buildings at this site will result in greater utilization of Metro and less traffic in rush hours. Residential emphasis should also help to prevent the area from having a closed-up and empty appearance in the evenings and on weekends, as is characteristic of office areas in downtown Washington.

In connection with development in this area, there are a number of additional steps that the City should take to enhance its potential value to Alexandria. First, the Metro station should be made easily accessible to the waterfront by bicycle and by a feeder bus system. Second, there should be pedestrian and bicycle access to Rosemont and to the south side of King Street. Third, there is a great need for the planting of street trees and for correcting the present lack of vegetation in the area. Fourth, the City should provide recreational facilities in the southeast portion of this development area and a linear park with bikeway along the Metro line connecting Braddock Road and King Street.

CHAPTER X: BRADDOCK ROAD STATION

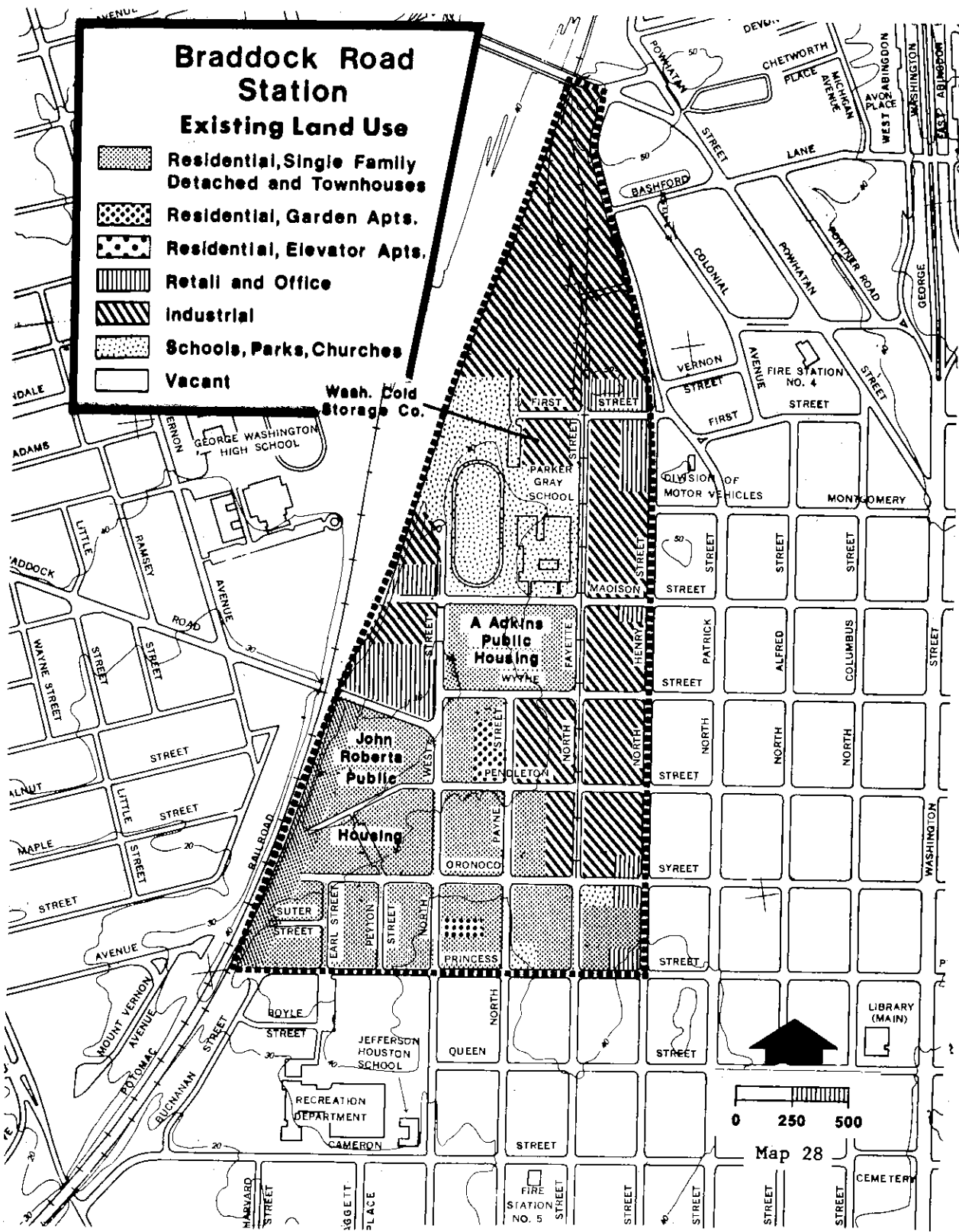
The Braddock Road Station growth area comprises about 90 acres in a triangular-shaped area around the site of the proposed Metro station on the north side of Braddock Road between West Street and the RF & P rail line. The growth area, bounded by Princess Street, North Henry Street, and the railroad on the south, east, and west sides, respectively, has a mixture of land uses and zoning districts. The major part of the area lies in RB and I-1 zoning districts. The principal land use in the RB-zoned areas is older, medium-density multi-family developments (including some public and publicly-assisted housing), while the I-1 zoned areas are characterized by low intensity, marginal light industrial uses concentrated along Henry Street and north of First Street (Table 45). The area is level and is not subject to any significant natural environmental constraints (Map 28, Map 29).

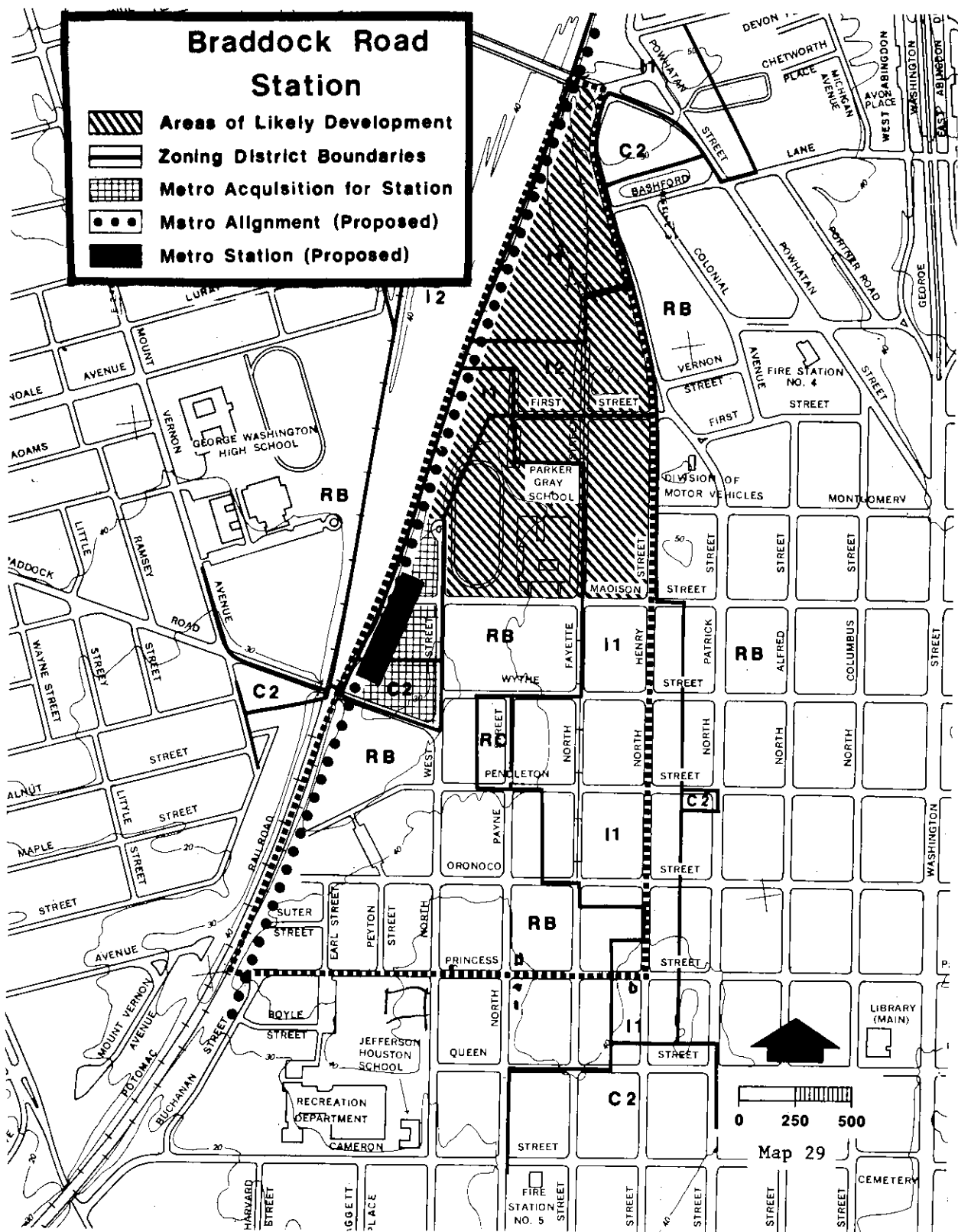
Table 45

Braddock Road Station, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Industrial	32.1	.47	Industrial	23.3
Commercial	3.0	.42	I-1	18.3
Residential	24.1	.38	I-2	5.0
Single family	20.8	.34	Commercial (all C-2)	3.4
Garden Apt.	3.3	.64	Residential	42.9
Public	8.0	.39	RB	41.9
Vacant	2.4	--	RC	1.0
Right-of-Way	20.4	--	Right-of-way	20.4
<u>Total</u>	90.0		<u>Total</u>	90.0

Land ownership in this area is very much fragmented, and there are few landholdings which reach the required two-acre minimum for redevelopment under a C0 rezoning. Unlike the





nearby North Waterfront and King Street Station growth areas, there are no existing trends toward redevelopment or land consolidation. Because of market limitations, and because other growth areas are more attractive to development and redevelopment, this growth area is generally expected to change little during the next twenty years, unless the City assumes a strong role in the redevelopment effort.

Likely Development

The likely development level in this growth area will be in major part determined by public policy decisions affecting it. City staff has recently begun a study of the ways in which existing housing in Census Tract 16 can be upgraded without displacing low and middle income families; policy recommendations affecting redevelopment possibilities will be part of the output of this study. The City will also make a decision about the future of Parker Gray School during the next few years. If public use of the school site is discontinued, the site's redevelopment could start a trend leading to changes in industrial land uses to the north and east of the site. Use of community development block grant funds to upgrade housing or community facilities could also spark private investment in the area.

A 1974 consultant's study identified the range of development potentials for the Braddock Road station area. With little or no public assistance or encouragement to redevelopment, development would consist of approximately 75,000 square feet of warehouses. With substantial public assistance, redevelopment within the next 20 years could include up to 400 garden-type or elevator apartments, 10,000 square feet of service retail, and about 75,000 square feet of new industrial uses; this has been adopted as the likely development level for study purposes.

If City policy continues to favor preservation of existing moderate income housing in the central and southern parts of the growth area, any redevelopment will tend to concentrate north of Madison Street, or in the blocks adjacent to Henry Street south of Madison. Redevelopment of most of the area north of Madison will be necessary to achieve the level of likely development indicated in Table 46. It should be noted that if Route 1 is relocated to parallel the Metro line through the growth area, its right-of-way would take

much of the area where new development seems most likely and most desirable, substantially reducing the likely level of development.

Table 46

Braddock Road Station, Likely Development Summary

<u>Type of Use</u>	<u>Level of Development</u>
Elevator Apartments (dwelling units)	400
Retail Space ¹ (square feet GFA)	10,000
Industrial Space (square feet GFA)	75,000

¹ Retail is limited to that estimated as needed to serve the increased number of dwelling units.

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The likely development level will induce population growth of 620 persons, representing increases of 3 percent and .5 percent respectively, in the 1974 population of Planning District I and the City.

2. Employment: The City's work force will be increased by 120 persons. About 80 percent of the new jobs will be in the industrial portions of the development, and 20 percent in the retail portion.

3. Schools: Because of the small amount of likely residential development, only 12 children will be added to public school membership. There will be no problems in absorbing these children into the existing school system.

4. Parks and Recreation: There are substantial outdoor recreation opportunities within or near this growth area. Within the area, there are three mini-parks (Interior Park, Buchanan Street Mini-Park, John Roberts Mini-Park) which provide play equipment, tot lots, and benches, and the Parker Gray School ground, which has a gymnasium and playing fields in addition to outdoor basketball courts and play equipment.

Table 47

Braddock Road Station

Likely Development Impacts Summary

<u>Impact Area</u>	<u>Magnitude of Impact</u>
<u>Demographic and Social Impacts</u>	
Population	620 persons
Employment	120 persons
Schools	
K-6	5 public school children
7-8	2 public school children
9-10	2 public school children
11-12	3 public school children
<u>Environmental Impacts</u>	
Sewage	49,000 gallons/day
Solid Waste	435 tons/year
Water	51,000 gallons/day
Electricity	6,500 kilowatts
Air Quality	Negligible
<u>Transportation Impacts¹</u>	
Automobile Trips	
A.M. Peak Hour, In	40 trips
A.M. Peak Hour, Out	65 trips
P.M. Peak Hour, In	90 trips
P.M. Peak Hour, Out	70 trips
Transit Person Trips	
A.M. Peak Hour, In	30 trips
A.M. Peak Hour, Out	75 trips
P.M. Peak Hour, In	105 trips
P.M. Peak Hour, Out	60 trips
Pedestrian Trips, P.M. Peak Hour	95 trips
Parking Required by Zoning Ordinance	549 spaces (3.9 acres of surface area)

¹ For south and west bound trips, assumes a modal split (auto/transit/walking) of 55/40/5 for residential uses, 30/10/60 for retail uses, 90/10/0 for industrial uses. For north-bound trips, assumes a modal split of 45/50/5 for residential uses, 30/10/60 for retail uses, and 90/10/0 for industrial uses.

There are major existing or planned recreation areas just outside of the growth area, including George Washington School and Braddock Field, Powhatan Park and the proposed Charles Houston neighborhood center which will replace the existing Pendleton Street Center.

At present it appears that the growth area is served by a reasonable amount of public recreation areas and open space. However, possible future development of the Parker Gray and George Washington/Braddock Field sites for other uses indicates that public open space may become less plentiful. If the City desires to maintain its current City-wide ratio of parks per 1,000 residents, 2.5 additional acres of private or public open space will have to be provided as the area develops.

B. Environmental Impacts

1. Sewage: The existing sanitary sewer system is adequate to handle the increase of 49,000 gallons per day which will result from the likely development.

2. Water: The existing water line has excess capacity sufficient to provide the 51,000 gallons per day needed by the likely developments.

3. Solid Waste: The impact of 435 additional tons per year of solid waste is evaluated in a subsequent section of the report.

4. Electricity: Vepco's capability to provide the 6,500 additional kilowatts of electricity is discussed in a subsequent section.

5. Air Quality: Because the likely development level is relatively low, there will not be any concentration of generated traffic sufficient to cause significant increases in CO pollution at any one point.

6. Noise: Noise disturbance to the growth area will originate from traffic on North Henry and the rail lines. In the narrow northern part of the area, the problem could be severe because of the convergence of noise from several sources. Because this northern area is the principal area

where redevelopment is expected, structures will have to incorporate sound-proofing measures sufficient to mitigate the problem.

7. Storm Water: Most of the growth area is already developed; any redevelopment which occurs will not increase runoff unless the development is in the few remaining vacant parcels. Existing storm sewers are adequate to handle the existing and anticipated runoff.

C. Transportation Impacts

1. Automobile Trips: Although the number of rush hour automobile trips generated by the likely development is relatively low (105 trips in the A.M. rush hour, 160 trips in the P.M. rush hour), there may be serious problems arising from conflicts between traffic attempting to leave the area (from new developments) and traffic approaching the Metro Station ("kiss and ride" traffic). This problem could be especially severe for any developments in the area north of First Street, because the station-oriented traffic will utilize First heavily, and northbound residents leaving the area (in the A.M. rush hour) will not be able to exit onto Route 1 from First. Therefore, any north bound traffic will have first to go south on Fayette or Payne to Madison, turn left, and subsequently make a second left turn onto Patrick or Washington. The only alternative to this movement is to allow direct access to Route 1 (from the area north of First). Because of the probable directional flow of the traffic, the problems will be much less severe in the P.M. rush hour, when most out-bound traffic will be south, and in-bound traffic will be mainly from the north.

The problems in the Washington Parkway - Route 1 corridor are discussed in a subsequent section.

2. Transit Trips. Because the area is near a Metro station, the estimated 105 transit trips in the P.M. rush hour are based on liberal assumptions of transit use. There will be no problem in accommodating the estimated ridership from the growth area.

D. Fiscal Impacts

The budgetary impact of the completed Braddock Road

Station likely development (in 1975 dollars) is estimated to be \$1.88 in revenues for each \$1 in expenditures (Table 48). Because of the relatively low level of development in the growth area, the need for any capital improvements as a result of the development is unlikely.

Table 48

Braddock Road Station Fiscal Impacts

	Annual Revenues	Annual Expend.	Difference
Elevator Units (400)	319	186	133
Retail Gross Floor Area (10,000 ϕ)	14	2	12
Industrial Gross Floor Area (75,000 ϕ)	29	4	24
Capital Costs	--	0	--
Totals	361	192	169
<u>Revenue/Expenditure Ratio: 1.88</u>			
Alternative Totals ¹	361	161	200
<u>Alternative Revenue/Expenditure Ratio: 2.24</u>			

¹ Alternative calculations exclude debt service from expenditure.

This growth area ranks below most of the other areas because it contains less retail and lacks other uses (e.g., hotel) which have high ratios, and because the dwelling units are presumed to be entirely medium-priced (rather than half medium- and half high-priced as in most of the other areas). The ratios of the Braddock Road and King Street Station areas are about the same, the King Street ratio being slightly less (in spite of substantial retail) because of the presence of single-family units in the area and the need for certain capital projects.

Conclusions and Recommendations

Although this area includes a Metro station, the prospect of significant development is far less likely and far more

speculative than at King Street, North Waterfront, or Potomac Center. There has been virtually no new construction of any sort near the Braddock Road site for over a decade. Few, if any steps seem to have been taken by developers toward assembling property or to plan construction in anticipation of the subway operation, in contrast to what has happened near other Metro stops.

Because other potential development areas can absorb all the projected market demands in the City, it may be that developers will pass over this area in future years as they have already passed over it in the first wave of Metro-inspired land speculation and development. The City should give serious consideration to whether such inaction is desirable and whether the City should act to encourage private development. Obviously, significant development at this site would benefit the City by causing greater utilization of the Braddock Metro stop and by bringing in additional tax revenues. On the other hand, major development might well have a serious adverse impact on existing residents in the area by increasing traffic volumes on local streets and by displacing persons now living in the area after redevelopment of residences for a higher income market. City Council's stated policy of encouraging conservation of the area's existing residences for low to moderate income groups is sound.

In the event that development becomes likely, certain guidelines should be followed. First, the City should channel development to the area north of Madison Street, with building heights scaled away from existing residences (south to north). Second, the City should encourage residential redevelopment of the existing light industrial uses which now generate large amounts of heavy truck traffic. Third, the City should rezone the northern portion of the growth area to C0 or to a residential zone and should reduce the permissible densities (now an FAR of 7). Fourth, the City should provide earth berms, shrubbery, or other noise buffers along the Metro line (along with a linear park and bikeway) between Braddock Road and King Street.

Significant amounts of high-rise construction in this area might well generate enough traffic to choke Braddock Road and smaller local streets. This negative impact perhaps can be avoided by providing new development with easy

northbound access to Route 1 and by cutting off access to local streets in the area south of Madison Street. Recommendations about the transportation network in this area are very difficult in the absence of a final decision on the relocation of Route 1; therefore, the City should seek early completion of the study concerning the relocation.

The Braddock station is potentially valuable to other parts of the City; it should be made readily accessible to areas which are beyond walking distance. For this purpose, the City should widen Braddock Road between the station and Mount Vernon Avenue and provide a turning loop at the station to permit quick round-trip bus and auto rides to the station from the west. These improvements are the minimum needed to handle the existing traffic plus station-oriented traffic from the west. Similarly, a loop with special access for bicycles and buses should connect the station with the North Waterfront.

The City has a significant amount of control over development around the Braddock Road Station because of its ownership of school sites and public housing sites in the area. If it maintains all these properties in their present uses, redevelopment in the area will be limited; however, if the City determines that some of these properties are no longer needed for their present uses, their redevelopment in medium- to high-density residences (both garden apartments and mid-rise) could provide an attractive development which would spur private redevelopment in other parts of the growth area. However, any deliberation concerning reuse of the City-owned properties should involve citizens from the area in planning type, design, and intensity of the new use. Furthermore, any decisions concerning the properties should recognize the need to conserve existing housing.

CHAPTER XI: POTOMAC CENTER

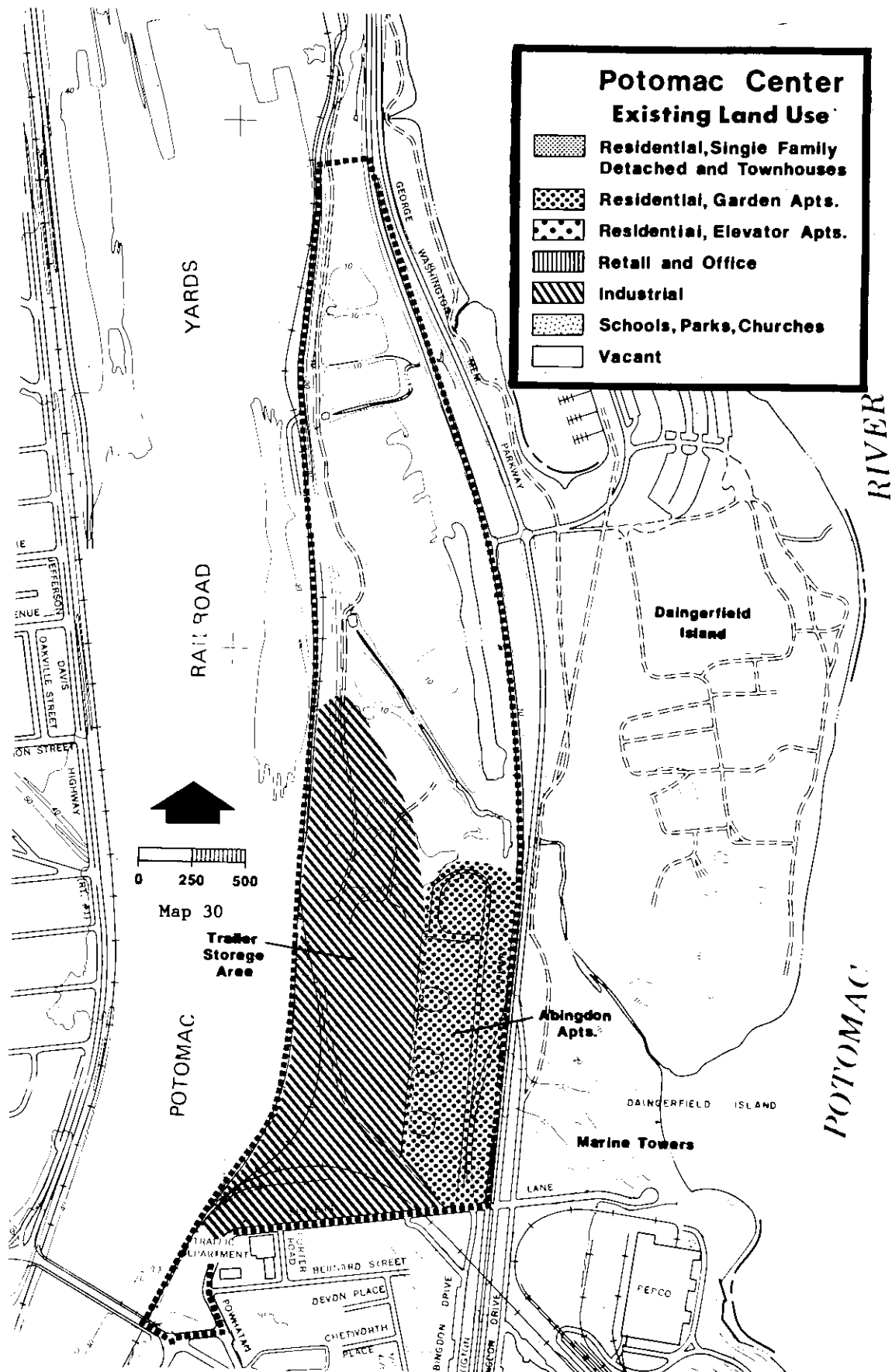
The Potomac Center growth area comprises approximately 90 acres in the northeast part of the City, located north of Slaters Lane between the RF&P rail yards and the Washington Parkway. Most of the growth area is zoned I-2, with the remainder in the I-1 and RC zoning districts. RF&P uses the southern part of the I-2 zoned portion of the property for its piggybacking operation (trailer parking), while the northern part is vacant. Several warehouses occupy the I-1 area on Slaters Lane, and the RC area follows the property lines of the Abingdon and Park Ridge Apartments in the southeast, two of the earlier apartment developments in the City, built in the 1940-1944 period (Table 49, Map 30). The Alexandria Old and Historic District encompasses a strip of land extending 500 feet into the area from the center line of the Parkway. Metro will generally follow the western boundary of the growth area (next to RF&P yards), although in the northern part, Metro's right-of-way may be more toward the center of the area (Map 31).

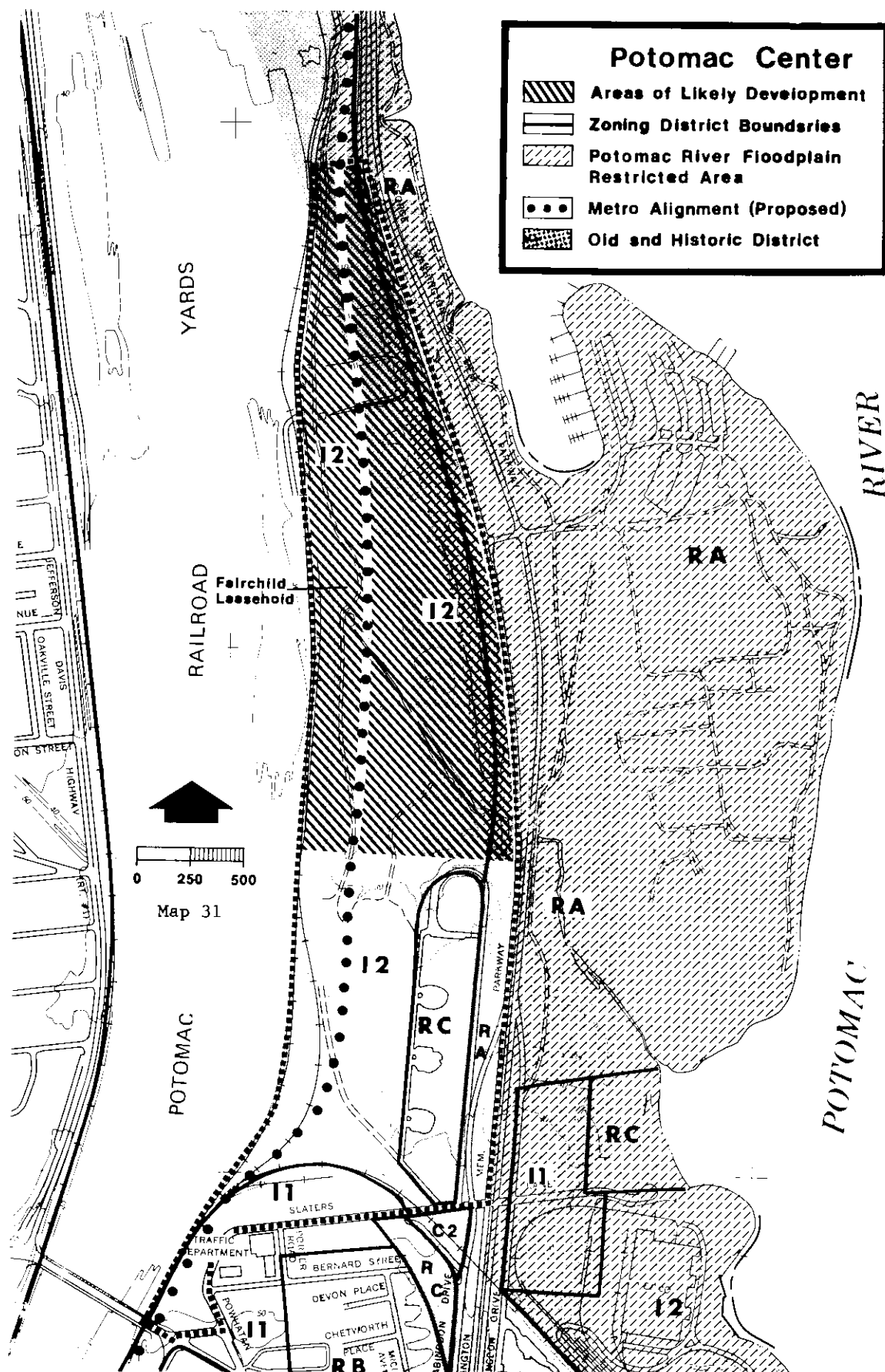
Table 49

Potomac Center, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Industrial	23.6	.05	Industrial	80.6
Warehouses	2.0	.62	I-1	7.0
Trailer Pkg.	21.6	0	I-2	73.6
Residential	9.4	.74	Residential	9.4
Vacant	57.0	0	RC	9.4
Right-of-way	0	--		
<u>Total</u>	90.0		<u>Total</u>	90.0

Environmental characteristics of the area place some constraints on development. Owners have filled the southern part of the area (parts used for trailer parking and apartments) to 30 feet above mean sea level; however, the vacant northern portion averages about 10 mean feet above sea level, and includes a strip along the eastern edge which is below 10 feet and is in the Potomac River flood zone. Except for the





topographic breaks between filled and unfilled areas and on the edge of the flood zone, the land surface is flat. High-rise construction will require special foundations at considerable depth. Although Potomac Center has the major advantages of its prime location near employment centers, environmental conditions, the lack of municipal services, congested traffic conditions on the Parkway, and other problems severely limit development prospects.

Likely Development

Within the past several years, developers have put forward tentative proposals for the development of Potomac Center. In Spring, 1974, Fairchild and Company, leaseholder of 38.6 acres in the northern half of the growth area, submitted preliminary plans and studies for a proposed development of this portion of the tract. The proposal, which called for construction in three phases between 1975 and 1990, included over 4 million square feet of office space, almost 1.5 million square feet of retail space including a 540-room hotel, and approximately 2,000 high-rise dwelling units - all in 16 structures ranging up to 30 stories in height. A major factor making a development of this scale possible is the federal government's agreement to allow Fairchild and Co. to construct a grade separation over the Parkway, providing access to the property. The federal government agreed to allow the overpass (without consulting the City) in exchange for a donation of land along the Parkway south of the City.

The City staff's review of the preliminary information revealed that the proposed level of development would have substantial negative aesthetic impacts, would overwhelm the capacity of Washington Parkway and certain other streets, would necessitate upgrading of certain City services, and would provide almost as much office space as is projected to be absorbed in the entire City during the 15 year period of development. ~~X~~ Recently, another potential developer of the site has come forward with a somewhat more modest proposal. This tentative plan retains the 2,000 dwelling units and hotel of the Fairchild proposal, but it reduces the office and retail space substantially to 2.5 million square feet.

City staff evaluated these proposals in terms of existing traffic conditions on the Parkway, Route 1, and Slaters

Lane, and based on their present or projected excess capacities, estimated that development at Potomac Center should be allowed to add a maximum of 1,000 automobile trips in- or outbound in the A.M. or P.M. rush hour. Use of this figure as the controlling factor produces a "likely" level of development which is considerably lower in office and retail space than either of the two tentative proposals mentioned above. Office and retail space bear most of the reduction in development intensity because they generate much more rush hour traffic for a given floor area than do residential or hotel uses. (Some office and retail uses are desirable, however, to preserve a mixed use character.) The likely development table (Table 50) also shows what development level will produce 1,000 cars in the absence of a Metro station on the site, assuming that only limited local bus service will be continued on the Parkway after completion of Metro.

Table 50

Potomac Center

Likely Development¹ in Comparison to Recent Proposals

	Elevator Dwelling Units	Office Space	Retail Space	Hotel Rooms
Original Fairchild Proposal	2000	4,000,000	1,500,000	540
Other Recent Proposal	2000	2,500,000	0	500
City Staff "Likely" (with Metro)	2000	465,000	40,000	400
City Staff "Likely" (w/o Metro)	2000	298,000	40,000	400

¹"Likely" development based on 1,000 auto trips limitation (in- or outbound in rush hour)

The impact calculations below are based on the "with Metro" likely level of development, thought to be the maximum that the City would allow in the area. If Slaters Lane is not improved, or if there is growth in Parkway traffic independent of development at Potomac Center, the 1,000 car ceiling will have to be reduced, with proportionate

decreases in development levels. The "likely" development, assuming a Metro station on site, would involve construction of about 10 average size high-rises for residential use; one large or two medium size buildings for the office and retail uses; and one large structure for the hotel. These buildings would be located in the northern part of the growth area, generally in the 38.6 acre tract of the Fairchild leasehold. It is assumed that there will be no effort to redevelop the existing garden apartments or to place a major development in the area now used by RF&P for trailer storage. The development of the area might begin within a few years (depending on how quickly negotiations between the City and developer proceed), but is more likely to start in the 1980's.

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The 2,000 dwelling units in the likely development level will increase the 1974 population of Planning District I by 14 percent, and of the City as a whole by 3 percent (3100 persons). As in the case of most of the other growth areas, upper-middle and upper income individuals, couples, and small families will probably occupy the new development. Because of the isolation of the area, the residents may tend to form a separate, distinct community having little identification with the rest of the City.

2. Employment: The likely development level will increase the City's work force by 2260 (5 percent) over the 1974 level; almost 90 percent will be office workers.

3. Schools: Because it is now vacant, the Potomac Center area is not included in any of the City's elementary school districts. Elementary students in neighborhoods immediately to the south attend several different schools, all now at capacity. However, there are other schools with excess capacity which can absorb the additional 26 lower-grade students.

4. Parks and Recreation: Because this growth area is relatively isolated, it will have little impact on recreation resources in the rest of the City. Daingerfield Island (almost 100 acres) is a major potential resource (it is now underdeveloped and is under management of the

Table 51

Potomac Center

Likely Development Impacts Summary

<u>Impact Area</u>	<u>Magnitude of Impact</u>
<u>Demographic and Social Impacts</u>	
Population	3100 persons
Employment	2260 persons
Schools	
K-6	26 public school children
7-8	8 public school children
9-10	10 public school children
11-12	14 public school children
<u>Environmental Impacts</u>	
Sewage	340,000 gallons/day
Solid Waste	2,900 tons/year
Water	356,000 gallons/day
Electricity	52,500 kilowatts
Air Quality	See text.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	680 trips
A.M. Peak Hour, Out	430 trips
P.M. Peak Hour, In	600 trips
P.M. Peak Hour, Out	1000 trips
Transit Person Trips	
A.M. Peak Hour, In	380 trips
A.M. Peak Hour, Out	440 trips
P.M. Peak Hour, In	590 trips
P.M. Peak Hour, Out	620 trips
Pedestrian Trips	380 trips
Parking Required by Zoning Ordinance	4215 spaces (30 acres of surface area)

¹ For south and west bound trips, assumes a modal split (auto/transit/walking) of 70/20/10 for office uses, 85/10/5 for hotel uses, 30/10/60 for retail uses, and 50/40/10 for residential uses. For north bound trips, assumes a modal split of 55/35/10 for office uses, 70/25/5 for hotel uses, 30/10/60 for retail uses, and 40/50/10 for residential uses.

National Park System). Because of the size of the area in relation to the likely development level, there would be ample opportunities to provide the 12.4 acres of open space needed to maintain the existing City-wide ratio of park acreage per 1,000 residents. Daingerfield Island can meet much of the need if the developer provides pedestrian access across the Parkway.

B. Environmental Impacts

1. Sanitary Sewers: At present, only an eight inch line serves the proposed development area. The existing line along the North Lee Street right-of-way will have to be extended to serve the new developments, and a pump will be required to force the sewage over the low drainage divide separating this growth area from the Potomac interceptor. The addition of 340,000 gallons per day of sewage combined with the sewage from probable development of North Waterfront would require that the Lee Street interceptor be expanded from an eighteen to a twenty-seven inch line.

2. Water: The closest existing water main, just to the southwest of the growth area, has sufficient flow to meet the added demand for 356,000 gallons per day. To serve the development, a major line would have to be extended northward almost a mile from the existing main.

3. Solid Waste: The impact of an additional 2,900 tons of solid waste per year is evaluated in a subsequent section.

4. Electricity: The development will generate a demand for an additional 42,000 kilowatts. This impact is evaluated in a subsequent section.

5. Air Quality: The "worst case" point of analysis for CO pollution impact of the Potomac Center likely development is the access point on the George Washington Parkway. At this point, there is heavy existing traffic volume of 2717 cars (both ways) in the P.M. rush hour and as much as 75 percent of the traffic generated by the development (or 1200 cars) might use this access point on some days. Under the most unfavorable meteorological conditions, on such days, CO pollution at the access point will increase by about 45 percent, to almost 30 ppm when congested conditions

keep traffic at a relatively slow 10 mph; this projection is based on 1975 CO emission factors (Table 52). CO pollution will, under these conditions, approach the national one-hour primary standard of 35 ppm. "Existing" pollution levels in the table below are derived from present traffic volumes (2717 cars), while "added" pollution is based on the maximum of 1200 cars which will use this access point leaving or coming into the development.

Table 52

CO Concentrations at Completion of Likely Development
at Access Point on G.W. Parkway¹
(in parts per million at P.M. rush hour)

Emission Factor Year	10 mph Average Speed			30 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	20.6	9.1	29.7	7.9	3.5	11.4
1980	6.5	2.9	9.4	2.4	1.1	3.5
1985	3.0	1.3	4.3	1.1	.5	1.6

¹ The estimated CO concentrations decline over the emission factor years because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worse case assumption (i.e., average vehicle emissions will not decline).

7. Storm Water: Because of the level topography and the lack of internal drainage, there is at present little runoff from the growth area. The likely development level will increase the magnitude and rapidity of runoff considerably, and even with provision of on-site retention structures, substantial upgrading of the storm sewers serving the area (beneath the Parkway) will be required to prevent flooding in the area. There is a limitation on filling in the area, any filling in this area will require approval of the Director of Transportation and Environmental Services.

C. Transportation Impacts

1. Automobile Trips: The likely development level will

generate approximately 1600 automobile trips in the P.M. rush hour. About 720 of these will be office workers leaving the area to return to residences located (in most instances) to the south or west of the area; most of the remainder will be inbound residents, mainly from employment centers to the north. The total number of outbound trips is 1000 cars, the maximum amount of traffic which this growth area could contribute to the Route 1 - Parkway system without pushing these roadways beyond capacities. The overall Planning District I corridor traffic situation is evaluated in a subsequent section.

Access to the area will be via an overpass and ramp entrances from the Parkway, which the federal government (without City participation) has agreed to allow the developer to construct, and possibly via Slaters Lane, but the congestion on Slaters will limit the amount of traffic using this access point to an estimated maximum of 25 percent of the total traffic generated, unless Slaters is widened.

2. Transit Trips: If there is a Metro station in the growth area, A.M. rush hour ridership of 820 persons and P.M. rush hour ridership of 1217 persons (in and out) are expected. If no Metro station is provided, transit use will decline greatly, assuming that Metro will reduce bus service along the Parkway when the rapid rail system is completed.

D. Fiscal Impacts

Potomac Center's estimated revenue-expenditure budgetary impact ratio of 2.17 places it third among the growth areas, behind only Dip Commercial and North Waterfront (Table 53). All of the uses which are likely on the site have high revenue - expenditure ratios. The only capital expenditure which the City will have to undertake as a direct result of the development is the widening of Slaters Lane to four lanes. This project, which will cost about \$500,000, is not in the City's current Capital Improvements Program.

Table 53

Potomac Center Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Elevator Dwelling Units (2000)	1,757	862	895
Office Gross Floor Area (465,000 sq)	262	110	152
Retail Gross Floor Area (40,000 sq)	57	8	49
Hotel Units (400)	198	26	172
Capital Costs	--	44	- 44
Totals	2,274	1,050	1,224
<u>Revenue/Expenditure Ratio: 2.17</u>			
Alternative Totals ¹	2,274	830	1,444
<u>Alternative Revenue/Expenditure Ratio: 2.74</u>			

¹ Alternative calculations exclude debt service from expenditures.

Recommendations and Conclusions

It is not surprising that the Potomac Center growth area has remained vacant. It is sandwiched between a railroad yard and a major highway, has access to only one major road, is uncomfortably near the approach zone of National Airport, and parts of it are within the Potomac River flood zone. The area in its natural state has aesthetic value, contributes to the sense of openness along the Parkway, enhancing the beauty of a major gateway to the City.

There have been two tentative proposals for the development of the northern part of the growth area, in each case the proposal contains too much commercial (office and retail) floor space. However, because the development will or might require height limit variances, rezoning for any residential

use, and approval of the Director of Transportation and Environmental Services before any filling in flood zone areas may be undertaken, the City can guide the type and intensity of development.

It is of particular concern that development at this site not strangle traffic movement on the Parkway or Route 1. The City should not grant any rezonings or other necessary authorizations unless the developer first gives firm and binding assurances that he will build a Metro station at the site (at his cost). The developer also should pay for all upgrading of water and sewage lines, and for provision of a buffer of trees and shrubbery between the Parkway and Potomac Center. The City should observe the existing height limits at the site (including the height limit in the Old and Historic District), should not grant any flood plain variances, should attempt to preserve the memorial character of the Parkway, and should limit density at the site to permit at most a level of development which will generate 2,000 in- and outbound automobile trips (maximum of 1,000 either way) in the peak hour.

These are stringent requirements, but they are fully justified under the circumstances. Aside from some possible tax benefits, overly intensive development at this site promises only severe adverse traffic consequences to residents of the City in Planning District I. The recommendations suggested above will reduce these consequences and will help preserve the appearance of this gateway to the City.

Potomac Center should not look like Crystal City. This goal can be accomplished by having variable building heights (within the present maxima), by avoiding a wall-like effect, by facing apartment buildings away from the railroad tracks, by building an internal pedestrian circulation system, and by scaling densities from north to south, away from apartments and townhouses in the northeast section of the City. Potomac Center should have a mix of residential and office uses with sufficient retail space to provide for the needs of persons living and working there; it should contain a variety of apartment sizes and prices to encourage a balanced population mix.

CHAPTER XII: NORTH WATERFRONT

North Waterfront is a 195-acre growth area located a few blocks north of the CBD, extending northward to Daingerfield Island between Washington Street and the Potomac River. The area encompasses a variety of zoning districts, with the predominant zones being I-1 and I-2 (about half of the total area, concentrated in the northern and eastern parts), C-2 commercial (a strip two blocks deep along Washington), RA residential (an area of older garden apartments north of Second Street) and CO (for recently approved high-rise residential developments). Land Use in the area is similarly varied; low intensity commercial and industrial uses abut both older garden apartment developments and new high-rise structures under construction (Table 54, Map 32). The prime location of this growth area is expected to cause much additional redevelopment during the next 15 years (Map 33).

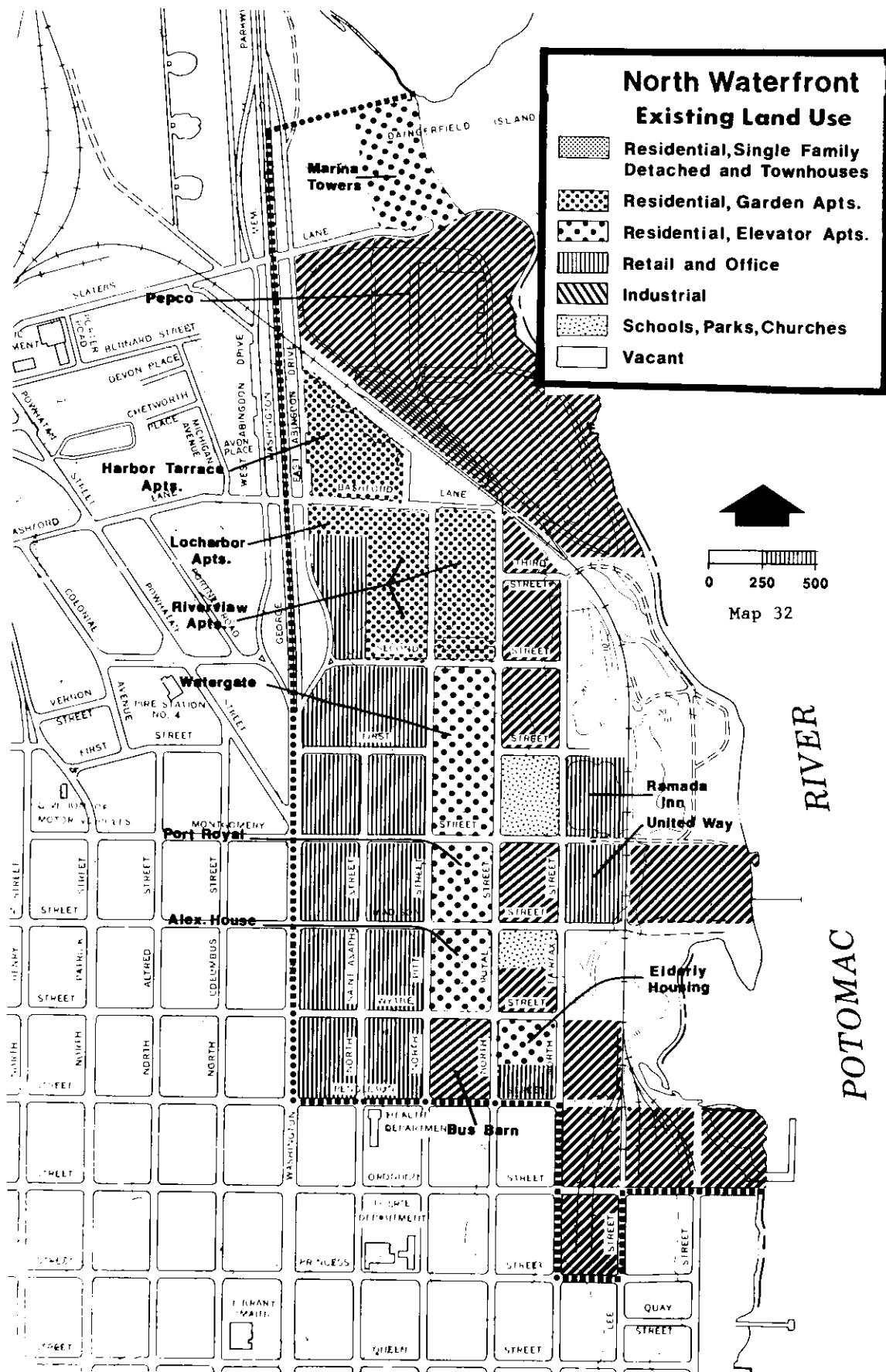
Table 54

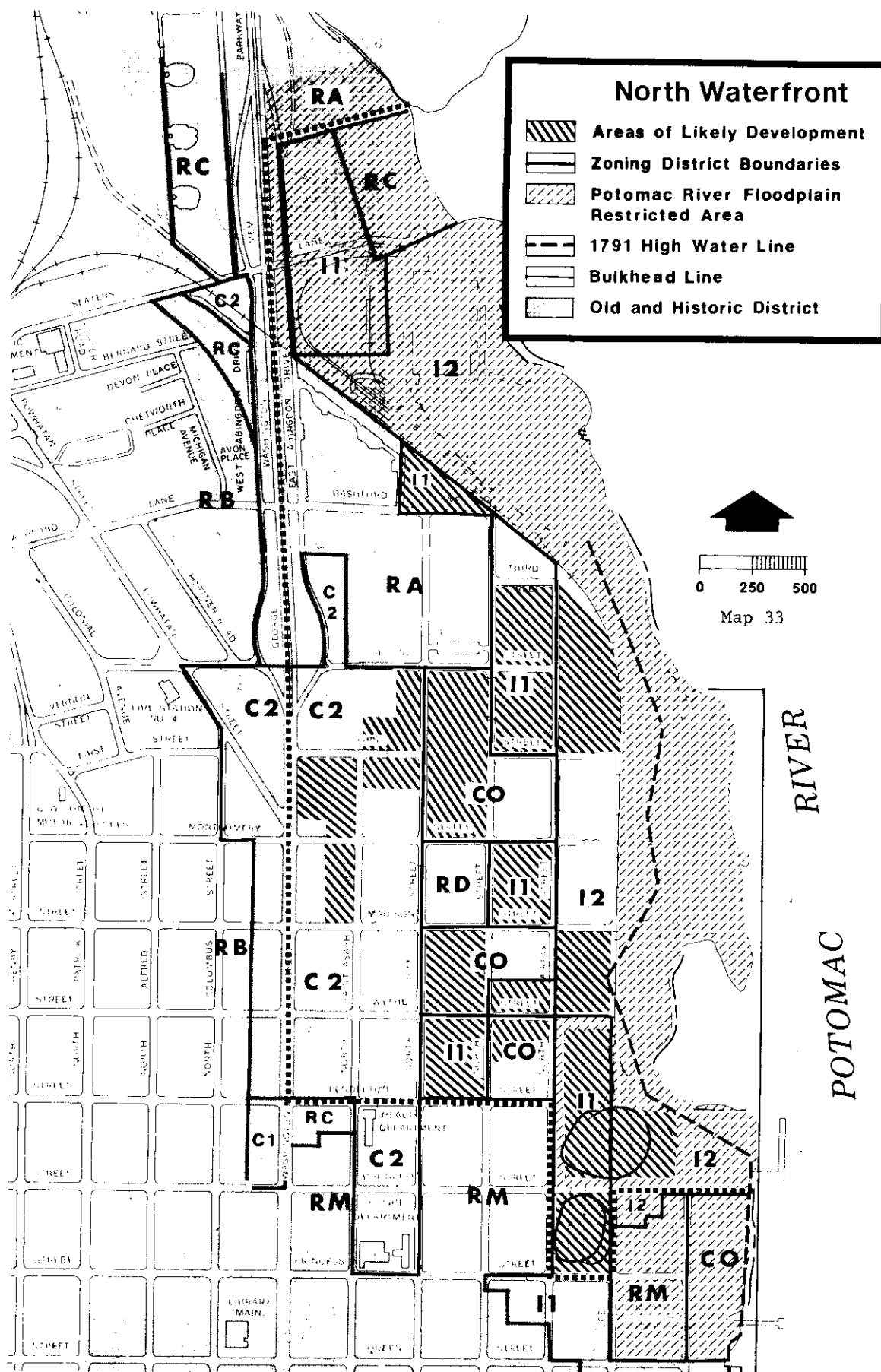
North Waterfront, Present Characteristics

Land Use	Acres	FAR	Zoning	Acres
Industrial	61.6	.24	Industrial	97.4
Commercial	23.2	.86	I-1	25.0
Residential	21.8	1.74	I-2	72.4
Gard. Apts. 11.9		.77	Commercial (C-2)	22.5
Elev. Apts. 9.9 ¹		2.90 ¹	Residential	16.7
Public	3.0 ²	--	RA	14.7
Vacant	37.9	--	RD	2.0
Right-of-way	47.5	--	Mixed Use (CO)	10.9
		--	Right-of-way	47.5
<u>Total</u>	195.0		<u>Total</u>	195.0

¹ Land Use and FAR's for elevator apartments' land use exclude 3.0 acres which are part of the developments but which will be open to the public for recreational purposes (e.g., Montgomery Field).

² Privately-owned open space associated with Alexandria House and Watergate, which will be open to the public for recreational purposes.





Environmental conditions offer some constraints on redevelopment of the area. The soils require substantial foundation work before they can carry the weight of high-rise structures. The south central portion of the area includes the site of a former dump; developers must make provisions to allow the methane gas in the soil to escape. The Potomac River flood zone encompasses most of the area east of Lee Street and also includes two blocks to the west of Lee, between Wythe and Oronoco. Although construction is not prohibited in these areas, developers must design structures to comply with the flood control provisions of City ordinance.

Likely Development

The likely development level in this growth area includes Alexandria House, Watergate, the ARHA elderly housing, the new Robinson warehouse, and other properties which, if current trends continue, are likely to be developed for more intensive use. Alexandria House and Watergate will add 828 dwelling units and a limited amount of professional office and retail space to the area. The housing for the elderly will include 170 units in an eight-story structure. The planned Robinson warehouse will add about 36,000 square feet of industrial space. In addition to these known developments, there is an estimated 28.5 acres expected to be redeveloped because present uses are marginal, deteriorated, or low-intensity. As long as there is a title dispute concerning the area east of the North Lee right-of-way, development will not occur there. Because the resolution of this conflict cannot be predicted, no development estimate has been made for the area involved.

Most of the parcels within the 28.5 acres of likely redevelopment are large enough to qualify for CO rezonings, and smaller parcels are expected to be assembled to the required minimum of two acres. Based on what fragmentary information is available about the desires of developers, the likely development area has been apportioned as follows among types of development: two acres for a hotel, three acres for townhouses, and the remaining 23.5 acres for mid-rise or high-rise residential, office, and retail development. The estimated average FAR of developments on the 23.5 acres is 2.25, based on the CO zone permitted FAR for parcels of three to four acres in size. It is estimated that about

60 percent of the floor area will go into residential use, and 40 percent into office or retail use.

The completed likely development level will consist of 75 townhouses, about 2150 elevator dwelling units, a 400-room hotel, and about 990,000 square feet of office, retail, and industrial space (Table 55). Approximately 15 structures of the size of Alexandria House will be required to house these developments, if all of the development occurs in structures of that size.

Table 55

North Waterfront, Likely Development Summary

	Town- houses	Elev. Units	Office Space	Retail Space	Indus. Space	Hotel Rooms
Known Developments		998	15,000	20,000	36,000	0
Other Future Development	75	1150	800,000	120,000	0	400
Total Likely Development	75	2148	815,000	140,000	36,000	400

Impacts of the Likely Development

A. Demographic and Social Impacts

1. Population: The likely development will help reverse the population decline which has been occurring recently in Planning District I, increasing the District's 1974 population level 15 percent (3500 persons), while increasing the entire City 1974 population by 3 percent. Because the residents will be mainly from upper middle and higher income groups, the development will reinforce the existing trend for higher income groups to return to older sections of the City.

2. Employment: The City's work force will be increased by almost 4000 (7 percent) over the 1974 level. Approximately 86 percent of these workers will be employees in the office portions of the development.

3. Schools: Since the closing of the Ficklin School,

Table 56

North Waterfront

Likely Development Impacts Summary

Impact Area	Magnitude of Impact
<u>Demographic and Social Impacts</u>	
Population	3500 persons
Employment	4000 employees
Schools	
K-6	49 public school children
7-8	15 public school children
9-10	17 public school children
11-12	21 public school children
<u>Environmental Impacts</u>	
Sewage	420,000 gallons/day
Solid Waste	3,600 tons/year
Water	443,000 gallons/day
Electricity	53,000 kilowatts
Air Quality	See Text.
<u>Transportation Impacts</u> ¹	
Automobile Trips	
A.M. Peak Hour, In	1100 trips
A.M. Peak Hour, Out	605 trips
P.M. Peak Hour, In	1015 trips
P.M. Peak Hour, Out	1760 trips
Transit Person Trips	
A.M. Peak Hour, In	455 trips
A.M. Peak Hour, Out	410 trips
P.M. Peak Hour, In	585 trips
P.M. Peak Hour, Out	740 trips
Pedestrian Trips	565 trips
Parking Required by Zoning Ordinance	5791 spaces
	(41.2 acres of surface area)

¹ For south and west bound trips, assumes a modal split (auto/transit/walking) of 60/30/10 for residential uses, 75/15/10 for office uses, 80/10/10 for retail uses, 85/10/5 for hotel uses, and 90/10/0 for industrial uses. For north bound trips, assumes a modal split of 50/40/10 for residential uses, 60/30/10 for office uses, 80/10/10 for retail uses, 70/25/5 for hotel uses, and 90/10/0 for industrial uses.

elementary students from the North Waterfront have been sent to the paired Jackson and Polk grade schools.

4. Parks and Recreation: At present, there is limited public park and recreation space within the North Waterfront area. Montgomery Field, containing a playing field and several tennis courts, is part of the Watergate site; the facilities will remain open to the general public after the building is finished. The lot in the 600 block of N. Fairfax will be lost after ARHA completes the planned housing for the elderly. Founders Park and Daingerfield Island, just outside the growth area to the southeast and north, respectively, have significant recreation potential for the area's residents, but both require further development. The City's approved bike trail system includes a segment along the Lee Street right-of-way which will link up with trails along the Parkway to the north and along the Waterfront to the south. The Charles Houston Neighborhood Center will soon be under construction a few blocks west of Washington. Overall, it appears that, except for a lack of playing fields, the growth area's residents will have a variety of recreation opportunities nearby. However, if the City is to maintain the existing overall ratio of park acres per 1,000 population, an added 14.1 acres of recreation space will be needed.

B. Environmental Impacts

1. Sanitary Sewers: An eighteen-inch sewer line along the Lee Street right-of-way serves North Waterfront; because of the area's sparse, low-intensity development, the line is now well below its capacity of 3 mgd. This line can accommodate the additional 420,000 gallons/day of sewage resulting from the development.

2. Water: The existing water line serving the area can accommodate the additional demand for 443,000 gallons per day.

3. Solid Waste: The impact of 3600 additional tons per year of solid waste is evaluated in a subsequent section.

4. Electricity: The effect of the additional 53,000 kilowatts of electricity demand is also evaluated in a subsequent section.

5. Air Quality: The air pollution monitoring equipment at the City Health Department offices on North St. Asaph Street indicates that air pollution standards for various pollutants are rarely exceeded in this growth area. During occasional unfavorable meteorological conditions, however, certain secondary pollutants such as ozone briefly exceed standards. However, because of the equipment's location on top of the Health Department buildings, CO concentrations at roadside (where conditions are most critical) are not known. The table below shows the P.M. rush hour's "worst case" existing and added CO concentration at roadside at the intersection of Washington Street and any intersecting street which receives as much as one-third of the total inbound and outbound traffic generated by the growth area developments. "Existing" pollution levels are based on the present traffic volumes on Washington Street (about 2500 cars, both ways) while "added" pollution is derived from the estimated maximum amount of traffic (one-third of the total, or 1500 cars) which might on rare occasions concentrate on one of the crossing streets for access to or from Washington (Table 57).

Table 57

CO Concentrations at Completion of Likely Development¹
 Washington St. - Crossing St. Intersection
 (in parts per million at P.M. rush hour)

Emission Factor Year	10 mph Average Speed			30 mph Average Speed		
	Existing	Added	Total	Existing	Added	Total
1975	19.0	11.4	30.4	7.3	4.4	11.7
1980	6.0	3.6	9.6	2.3	1.4	3.7
1985	2.8	1.7	4.5	1.0	.5	1.5

¹ The estimated CO concentrations decline over the emission factor years because they assume the enforcement of emission standards and a continuous decline in automobile size. The 1975 emission factor year represents the worst case assumption (i.e., average vehicle emissions will not decline).

Under worst case meteorological conditions, roadside pollution at points along Washington Street could nearly reach the national primary standard of 35 ppm, if as much as one-third of traffic entering and leaving the expected

new developments utilizes just one of the intersecting streets.

Other sources of air pollution in the area are the Pepco Plant, which produces almost one-quarter of the City's air pollution, and the Norton Rendering Plant. The Pepco Plant exceeds the particulates standard for a point source and it approaches the sulfur dioxide standard; Pepco is operating under an EPA order to correct its pollution problems at the plant within three years. The Norton Rendering Plant's pollution is offensive odors. It is unlikely that either the Pepco Plant or the Norton Plant will relocate in the near future.

6. Noise: Noise disturbance to the North Waterfront growth area results primarily from National Airport. Examination of Noise Exposure Forecast contours prepared by the FAA indicates that a small portion of the growth area (entirely east of Lee Street) lies within the NEF-40 contour, which means that noise exposure is so severe that residential use would not be permitted. Most of the rest of the area lies between the NEF-40 and the NEF-30 contours, where residents will be subjected to undesirably high noise levels unless structures are specially designed to compensate for the noise.

In addition to the noise generated by aircraft, heavy traffic on the Washington Parkway will cause some disturbance to the area. Areas affected are those blocks immediately adjacent to the Parkway.

7. Storm Water: Because most of this growth area is already developed, the probable development will not cause a marked increase in the rapidity of runoff. The requirement that new developments provide for some on site retention indicates that disposal of rainwater during storms will not be a major problem.

C. Transportation Impacts

1. Automobile Trips: In general, the impact of an additional 2800 automobile trips in the P.M. rush hour must be evaluated with regard to overall conditions in the Route 1 - Parkway corridor, considering traffic contributed by other

growth areas as well (This analysis is found in a subsequent section.). However, certain observations can be made: (1) the Montgomery - Madison one-way pair can be expected to receive a major share of the traffic; the system may be insufficient to handle the flow; (2) to the extent that congestion on the Parkway and Route 1 prevent traffic from leaving the area easily in the P.M. rush hour, this traffic will go south through Old Town, increasing volumes on internal streets; and (3) the large likely level of development may necessitate an additional major access point to allow the A.M. northbound traffic to leave the area and the P.M. southbound traffic to get back into the area without causing major back-ups where side streets intersect the Parkway on the west edge of the growth area.

2. Transit Trips: The estimate of 1300 transit trips for the P.M. rush hour assumes that a feeder bus or people-mover system will be operational at the time of completion of development. Because the Metro trains will have large capacities, this number of additional riders will probably not strain the system. Without a feeder bus system, the number of transit users will decline substantially, as the number of automobile trips increases.

D. Fiscal Impacts

North Waterfront's estimated fiscal impact ratio of 2.73 places it above all the other growth areas except Dip Commercial (Table 58). This area ranks very high because the likely development includes a hotel and considerable retail space (the two land uses with the highest fiscal impact ratios) and because all the residential units are likely to be expensive, thus generating more tax revenues. The expenditure side includes the cost of extending Union Street north from Pendleton to connect with the Parkway, which may be necessary to accommodate the traffic generated by the new developments. This project is not listed in the City's current capital improvements program.

Table 58

North Waterfront Fiscal Impacts
(thousands of dollars)

	Annual Revenues	Annual Expend.	Difference
Townhouse Dwelling Units (75)	132	122	10
Elevator Dwelling Units (2150)	2,065	884	1,181
Office Gross Floor Area (815,000 sq)	459	179	280
Retail Gross Floor Area (140,000 sq)	200	20	180
Hotel Units (400)	198	26	172
Industrial Gross Floor Area (36,000 sq)	13	3	10
Capital Costs	--	105	- 105
Totals	3,067	1,339	1,728
<u>Revenue/Expenditure Ratio: 2.29</u>			
Alternative Totals ¹	3,067	1,122	1,945
<u>Alternative Revenue/Expenditure Ratio: 2.73</u>			

Conclusions and Recommendations

The North Waterfront is an area of critical importance to the future of Alexandria. Located adjacent to two of the City's greatest assets -- the Potomac River and Old Town -- the area has become extremely attractive to private developers impressed by its proximity to Washington. Development in this area must respect its location near the nation's capital through use of dignified design and provision of open space; it must be compatible with and not detract from the carefully preserved quality of Old Town. If North Waterfront is developed with these considerations as outstanding principles, it can be a source of beauty and satisfaction for the entire City. On the other hand, if unorganized development produces monotonous rows of highrise structures, the North Waterfront will fail not only to fulfill its own promise, but also will seriously undermine the present attractiveness of Old Town and the wider area.

There has been no comprehensive plan for developers to follow in the development of North Waterfront; the approach has been on a parcel-by-parcel basis. Results have not been satisfactory. Traditional height limits have been exceeded; no attempt has been made to integrate proposed and envisioned developments. One stumbling block to sensible planning has been the controversy over title to land immediately adjacent to the river. It is imperative that the title dispute be resolved as promptly as possible through federal legislation setting aside as much land as practical as parkland.

To accomplish the objectives cited above, it is important that much of this area, including a continuous strip along the river averaging at least a block in width north of Pendleton, be developed as a park. A park along the river should include the proposed bike path that will run down the North Lee right-of-way, and a public marina. The City should require developers to provide recreational facilities such as tennis courts and swimming pools on their properties.

The overall quality and appearance of development on the waterfront is of great importance. There must be free and easy public access to the river. Views to and from the river must not be blocked by unbroken masses of large structures. Substantial tree plantings will be necessary throughout. The City should require structured parking and it should take steps to eliminate the rendering plant. The area can be properly developed without filling of the Potomac.

The City must also take care to prevent excessive high-rise development which, if unchecked, will overshadow Old Town and generate more traffic than local streets can handle. In particular, the densities permitted in the existing commercial and industrial zones are far too high and should be reduced by at least 50 percent. The City should encourage variable heights within the existing 150-foot height limitation. There should be no more exceptions to the traditional height restrictions, in view of this area's close proximity to Old Town.

Developers should avoid similarity of design, the overall development should contain a mix of uses. Lower density uses such as townhouses should be intermingled with higher density development throughout the area. Sufficient commercial space should be provided. Office buildings should not be permitted to predominate. No more than 800,000 square feet of office space, nor more than about 2100 dwelling units (including those approved or under construction), should be built in the area. The garden apartment projects in the northwest corner of the area (Harbor Terrace, Locharbor, Riverview and Bashford Hall) should be preserved and upgraded, not replaced by high rise structures.

The streets serving this area are already congested. Completion of development which has been approved as well as future development in and near the area will worsen this problem. A comprehensive study should be undertaken of the Parkway/Route 1 Corridor. The City should provide bus and bicycle links between the North Waterfront and the Braddock Metro Station. Provision of such linkages will not solve the Parkway's traffic problems but would provide residents of the area with a realistic alternative to the automobile.

CHAPTER XIII: MAXIMUM LEVEL OF DEVELOPMENT PERMITTED UNDER ALEXANDRIA'S ZONING ORDINANCE

Committee Assignment

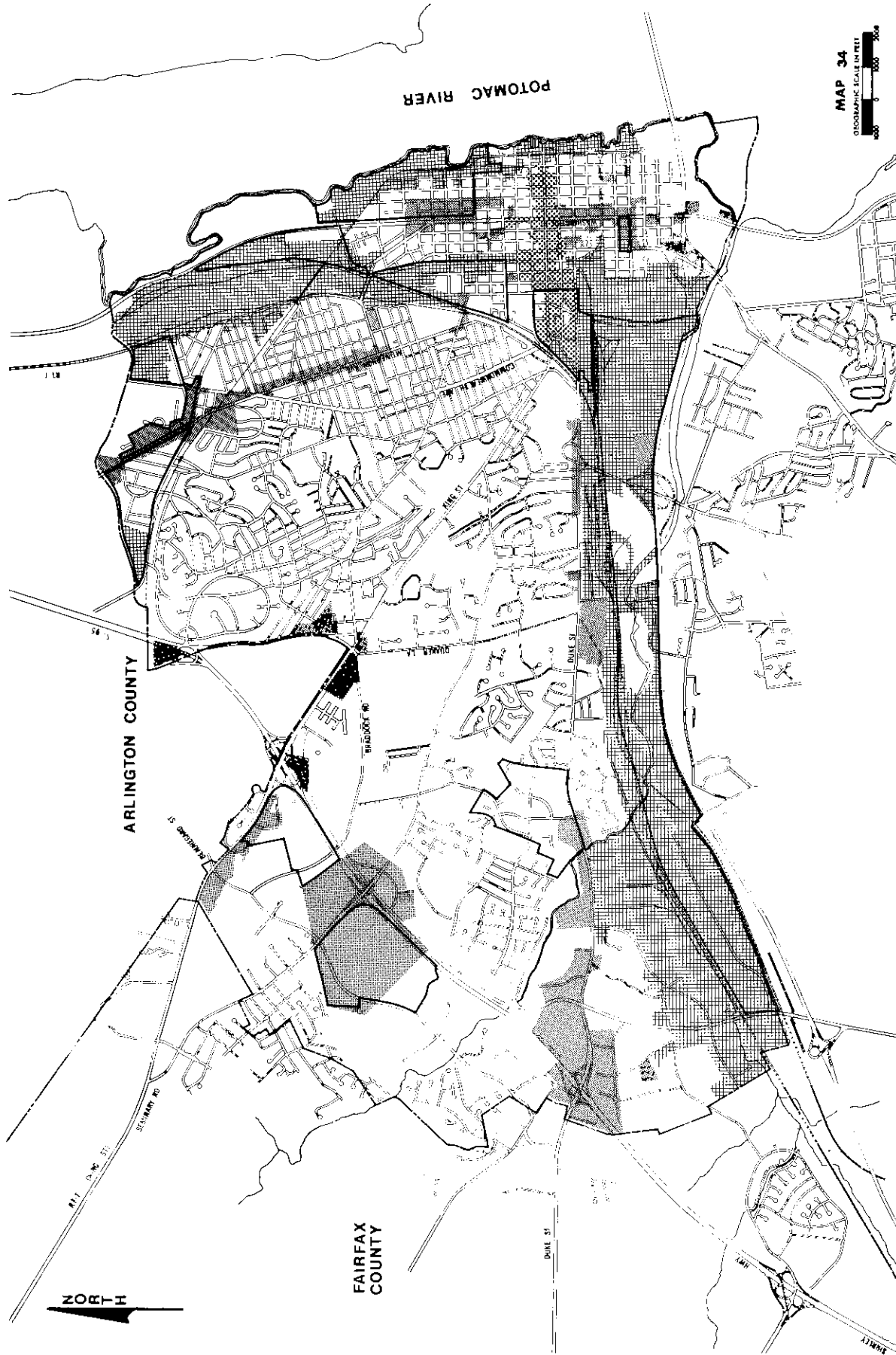
One of the assignments of the Potential Growth Areas Committee has been to review the amount of development which could take place in these ten growth areas under the City's existing zoning regulations. Because of changes in development trends in the metropolitan area resulting from sewer moratoriums in outlying areas, repercussions of the energy crisis, concern about urban sprawl, and the need for more concentrated development to make mass transit feasible, City Council recognized that development within the City to the maximum permitted intensities is becoming more likely. In fact, review of recent large developments and proposals for developments indicates that there is a well-established trend to higher density development.

The principal purpose of this assignment was to determine whether the amount of development possible under existing zoning regulations would have major negative environmental, social, or transportation impacts which might justify changes in certain provisions of the ordinance.

As background to the discussion of maximum development levels and impacts it is useful to review briefly the circumstances which resulted in the creation of regulations which many people now perceive to be inadequate to deal with the present trend toward high density development.

Background on the 1951 Ordinance

The chief area of concern is the permitted densities which were adopted by the City in its 1951 revision of the zoning ordinance. Of particular concern are the high floor-area ratios which were established for the industrial and commercial zones (Map 34). Of importance also are the questions of the inclusion of office buildings as a permitted use in industrial zones and the establishment of a uniform 150-foot height limitation for most areas of the City. Although there have been many changes in the ordinance since its



CITY OF ALEXANDRIA **ZONING DISTRICTS ALLOWING HIGH INTENSITY DEVELOPMENT**

- LEGEND**
- I-1 AND I-2 ZONED AREAS
 - C-3 ZONED AREAS
 - C-2 ZONED AREAS
 - BOUNDARIES OF POTENTIAL GROWTH AREAS
 - BOUNDARY OF CAMERON RUN VALLEY
 - SPECIAL STUDY AREA

adoption in 1951, these provisions remain essentially intact and are a source of continuing controversy. Therefore, the Potential Growth Areas Committee sought to understand the origin of these provisions.

To this end, the extant records and final report of the 1951 Committee were examined, and several of the 1951 Committee's members were interviewed, personally or by telephone, by staff members of the Department of Planning and Community Development. Below are listed some of the major findings of this effort.

(1) In drawing up the ordinance, the 1951 Committee made a conscious policy decision to create a liberal ordinance. As stated in paragraph two of their Report Summary, "Every attempt has been made, consistent with the general community welfare, to make this ordinance flexible and liberal; it being the consensus of opinion of the committee that the best regulatory law is that which accomplishes its purpose with a minimum of restraint on the individual property owner."

(2) The F.A.R. method of bulk control was written into the ordinance at the suggestion of a New York consultant, but the origin of the specific F.A.R.'s which were chosen is obscure. Important factors in the F.A.R. selection appear to have been (a) the influence of the consultant from New York, where very high F.A.R.'s were common; and (b) the Committee's desire to write a generally liberal ordinance.

(3) The 1951 Committee felt that the City needed to attract substantial amounts of industry to improve its tax base; partly for this reason the industrial zone F.A.R.'s were set very high to assure that no potential industrial development would be discouraged by restrictive regulations.

(4) Whether realized or not at the time, adoption of the high F.A.R.'s contained in the ordinance implied a decision to promote much more intense development than existed at the time. In 1951, there was no major commercial or industrial structure in the City which had a 3.0 F.A.R. (allowed in the C-2 zone), much less

the 6.0 and 7.0 F.A.R.'s allowed in the industrial zones.

(5) Office uses were allowed in the industrial zones in part because it was felt that there would be a need for offices in industrially-zoned waterfront areas if the City restored and revitalized the port.

(6) The writers of the uniform 150-foot height limitation thought that this limitation, coupled with the F.A.R.'s and minimum yard requirements in certain zones, would be adequate to allow light and air to reach ground levels. At the time of adoption, there were no major developments in the metropolitan area (e.g., Crystal City) by which the City could judge the validity of its uniform height limitation. Nor was there any apparent concern about urban design factors as considerations in setting height limits.

(7) An examination of minutes of City Council meetings of December, 1951, shows that debate and questions raised at public hearings and at joint meetings with the Planning Commission centered primarily on the setting of boundaries on the zoning map; there was relatively little public discussion on the substantive contents of the ordinance itself.

(8) The 1951 Committee members felt that the ordinance they prepared would serve the City for five to ten years. It was their feeling, at the time of adoption, that major revisions should be undertaken as development trends changed and as the City gained experience with the ordinance.

The following section describes the levels of development which might take place (in the potential growth areas only) if building were to occur at the maximum intensities permitted. The impacts of this extremely high level of development have been identified and evaluated in order to demonstrate the possible ramifications of large scale development at the high F.A.R.'s of the industrial and commercial zones.

Maximum Possible Development

To determine maximum possible development under existing zoning, it was necessary to determine the acreage in various zoning districts within the ten growth areas and to make certain assumptions about development of the land involved. Table 59 summarizes the inventory of acreage by zoning district and the level of development which would occur given the assumptions that are listed below the table.

The maximum development levels at the ten growth areas are estimated at 96 million square feet of commercial space and 23 million square feet (approximately 19,000 dwelling units) of residential space. This preponderance of non-residential uses is a result of the high proportion (23%) of the growth areas zoned industrially (where residential uses are prohibited) and the assumption that land zoned C-2 or C-3 would be developed half residentially and half commercially. To put these figures in perspective, this level of development would increase the number of dwelling units in the City by slightly less than 50 percent (although population would increase by only 26 percent) while increasing the existing amount of non-residential development by over nine-fold. (Recall that the growth areas constitute less than 10 percent of the City's land area.) The City is expected to be able to absorb this level of demand for residential uses over the next 20 years, but it would have to capture almost all of the Washington Metropolitan Area's office space demand over the next 20 years to achieve an increase of over 96,000,000 square feet of office space. This would represent 16 times the maximum amount of office development which the entire City can realistically expect to capture during this time (six million square feet of gross floor area) and would be equivalent in floor area to approximately 18 Crystal Cities, or 21 Pentagons, or 1400 buildings the size of Alexandria's City Hall.

Certain observations can be made about these levels and proportions of development.

- (1) The zoning ordinance permits levels of development which are completely out of touch with realities of the market for non-residential uses. Development of only the 270 acres of industrially zoned land within the 850 acres of the potential growth areas at a 4 F.A.R. (The

Table 59 Existing Zoning in the Growth Areas

	Acreage in Zoning Districts											Maximum Development Levels			
												Resid. (D.U.)	Non-resid. (S.F. of GFA)		
	R20	R12	R8	RA	RB	RC	RD	C2	C3	C0	I-1	I-2	Totals		
Arlandria E.					3.1		6.2	20.9			7.9	17.8	55.9	1270	8,858,000
Arlandria W.				59.9				12.9			12.2		85.0	1980	4,032,000
Braddock Rd. Station					41.2	1.0		3.4			18.3	5.0	69.6	1290	6,529,000
Dip Commercial								5.0			2.0		7.0	140	849,000
King St. Station					3.2		1.3		29.2		23.9	2.1	59.7	1010	10,703,000
North Waterfront				12.7			2.0	22.5		11.0	22.5	76.8	147.5	2480	30,766,000
Potomac Center											7.0	75.6	92.0	510	24,881,000
Shirley-Duke/Regina	13.5	1.5	1.8	80.7		9.4		21.6					119.1	2830	1,411,000
Stone Tract		10.9				63.0		10.1					84.0	3750	660,000
Winkler Tract						17.8		116.2					134.0	4130	7,593,000
Totals	13.5	12.4	1.8	153.3	48.2	91.2	9.5	212.6	29.2	11.0	93.8	117.3	853.8	19390	96,282,000

Assumptions Involved in Calculation of Maximum Development Levels

- (1) No distinctions are drawn among fully developed, unintensively developed, and vacant land within the growth areas. All land within the growth area is included in the calculations to show what impacts would result if the area were developed to the full permitted densities. As has been noted previously in the individual area chapters, much of the land in most growth areas is vacant or is in low-intensity, marginal uses.
- (2) All residential zones (through RD) are assumed to be developed to the maximum permitted density with residential uses only.
- (3) All I-1 and I-2 zoned areas are assumed to be developed with commercial uses to the full permitted density. No effort is made to distinguish proportions assigned to retail and office uses respectively. Residential uses are not permitted in these zones.
- (4) In C-2 and C-3 zones, which permit both residential and commercial uses, it is assumed that one-half of the land area is developed with residential uses, and one-half with commercial uses, both to the maximum permitted density.

F.A.R. of the proposed Montgomery Enterprises office building in North Waterfront) would produce more than 42 million square feet gross floor area of office and retail floor space. This level of development exceeds the Gladstone Associates twenty year maximum market absorption rate for all of Alexandria by six times. This means that in the City as a whole, market considerations will intervene to prevent the overall maximum amount of development. In a general sense, therefore, the permitted F.A.R.'s are so generous that they are irrelevant as development constraints.

(2) Highly attractive areas such as the North Waterfront are likely to attract some developments which are at or near the maximum permitted intensity. Therefore (as is subsequently shown), in the few instances where the F.A.R.'s do act as a brake on the intensity of development, they do so at such a high density that localized impacts are extreme.

(3) Maximum development within the growth areas under existing zoning is biased toward non-residential uses. In industrial zones, residential uses are not allowed, while in commercial zones residential uses are allowed at a lower F.A.R. than commercial uses. Balanced proportions of types of development are impossible to achieve except through rezonings, rewritings, ordinance provisions, and/or remapping.

Impact of Maximum Possible Development

The major concern relating to the maximum permitted development lies in their impacts on the City (Table 60) and the changes which development would bring about. The impacts are shown in summary form below.

- Workers would outnumber residents by almost 3 to 1 as 400,000 employees (or 10 times the present number) were drawn to the development areas.
- Almost 100 million square feet of non-residential structures would generate large amounts of traffic. Potomac Center and North Waterfront would generate over 90,000 cars outbound in the P.M. rush hour, necessitating an

Table 60

Impacts Summary, Maximum Possible Development
Under Existing Zoning¹

Impact Area	Magnitude of Impact
<u>Demographic and Social Impacts</u>	
Population	29,799 persons
Employment	409,199 employees
Schools	
K-6	
7-8	254 public school children
9-10	78 public school children
11-12	97 public school children
	136 public school children
<u>Environmental Impacts</u>	
Sewage	
Water	11,837,334 gallons/day
Solid Waste	12,415,684 gallons/day
Electricity	115,866 tons/year
Air Quality	1,272,927 kilowatts
	Worst point: addition of 477 ppm of CO at roadside during rush hour traffic
<u>Transportation Impacts</u> ²	
Auto Trips	
A.M. Peak Hour, In	
A.M. Peak Hour, Out	108,808 trips
P.M. Peak Hour, In	16,565 trips
P.M. Peak Hour, Out	30,163 trips
Transit Trips	158,073 trips
A.M. Peak Hour, In	
A.M. Peak Hour, Out	41,554 trips
P.M. Peak Hour, In	8,206 trips
P.M. Peak Hour, Out	14,005 trips
Pedestrian Trips	60,157 trips
	35,348 trips
Parking Required by Ordinance	272,163 spaces (equivalent to 1935 acres)

¹ For residential use impact calculations, factors developed for high-rise dwelling units were used. For non-residential use impact calculations, factors developed for office buildings were used.

² The modal split (auto/transit/walking) for residential uses was assumed to be 50/40/10; for non-residential uses, 70/20/10.

- additional 30 lanes of roadway in each direction in the Parkway - Route 1 corridor.
- All major roadways would be at 1000% or more of present capacity.
- Pollution levels along the G.W. Parkway would move to almost 300 ppm of CO during P.M. rush hour, exceeding the national primary standard by almost nine times or twice the CO concentration which COG has identified as causing severe damage to human health.
- Development would result in more than 217,000 parking spaces (equivalent to 1935 acres of surface areas).
- The development would result in extensive removal of vegetation in some areas and would create severe heat islands.
- A demand for more than 1,273,000 kilowatts of electricity would result, creating major additional demands for power now difficult to provide during severe weather conditions.
- The resulting twelve million gallons per day of sewage would almost equal the amount now being generated by the entire City and would use all of the extra capacity of the City's sewage treatment plant (now being expanded).
- 116,000 tons of solid waste would be generated annually and would have to be transported to landfill areas because the City incinerator is now operating at capacity.

It is apparent from the impacts in Table 60 - highlighted in the above discussion - that the City's zoning ordinance allows an inordinately high intensity of development which would completely change the character of the City and would produce impacts totally beyond the City's ability to accommodate. Although these levels of development would not occur throughout the City because of market constraints, they could occur in localized areas which have become especially attractive for development.

Recommendations

This chapter has addressed the most serious problem

of the City's zoning ordinance -- the excessively high level of development which can occur under the existing F.A.R.'s of certain zones. It is apparent that certain of the growth areas, in particular North Waterfront, Stone Tract and Winkler Tract, have locational, amenity and access advantages that might encourage private interests to develop them to the maximum intensity allowed under zoning. Therefore, it is quite possible that the levels of "likely development" for the ten growth areas could be concentrated almost entirely in these most attractive growth areas. This overconcentration of development in a few areas would generate extremely negative environmental impacts in adjacent neighborhoods.

Half of the 850 acres in the ten potential growth areas are zoned C-2, I-1 or I-2, and most of the growth in the ten areas and in the City as a whole will occur on land in these zones. Before the next surge in building activity begins, the City should therefore lower the F.A.R.'s of these zones to a level which will allow it to guide growth of these zones and prevent the negative impacts resulting from overconcentration of development. Analysis of the likely development levels of the previous chapters indicates that seven of the ten areas will be developed with average F.A.R.'s in the 1.5 to 2.5 range over the next twenty years. These levels of development produce impacts which approach or exceed the capacity of one or more City facilities or environmental systems in the neighborhoods surrounding the growth areas. F.A.R.'s above the range of the likely development levels would in most cases be undesirable. Although there will be some situations in which individual buildings with F.A.R.'s above the 1.5 to 2.5 range are acceptable, such high intensity developments should be carefully reviewed for possible negative impacts before approval for construction is given.¹

1

The C-3 zone, which applies to the CBD, has a F.A.R. of 6.0. This F.A.R. should be lowered for the same reasons as stated above. The recommendation of a precise F.A.R. ceiling is complicated by such factors as the small size of most parcels zoned C-3.

True industrial uses rarely require F.A.R.'s greater than 1.0. Therefore, the City should consider establishing a new industrial zone with an F.A.R. ceiling of 1.0, which could be applied to those areas of the City which are planned for industrial use over the long term.

These recommendations may imply that a comprehensive rewrite of the zoning ordinance is needed. However, since complete revision will be a time-consuming task and the changes suggested above are needed now, the reduction in F.A.R. ceilings for the C-2, C-3, I-1 and I-2 zones should be adopted prior to beginning a comprehensive review of the zoning ordinance.

CHAPTER XIV: OVERVIEW

Previous chapters addressed likely development at each growth area as well as the ramifications of that development on the existing neighborhoods within and adjacent to the growth area (pp. 72-171, supra). However, many of the problems associated with growth in Alexandria can only be meaningfully understood in the City or regional context. In this chapter, therefore, the impacts of development at the ten growth areas are summarized and discussed in terms of City and regional issues. This will be accomplished in three sections: 1) likely development at the growth areas, 2) citywide population, household and employment forecasts, and 3) cityside impacts of likely development at the growth areas. A fourth section will cover the Committee's overall recommendations.

Likely Development

Table 61 summarizes the Committee's estimate of likely development for the period 1975-1995 in the City. This includes development in nine of the ten growth areas, the Cameron Run Valley, and vacant land outside of the study areas as well as units under construction as of January 1, 1975. These estimates are summarized in the table and compared to staff estimates of 1975-1995 market demand based on Gladstone Associates' work for the Northern Virginia Metro Station Impact Study and the Cameron Run Valley Study. It must be emphasized at this point that although this table is a useful tool for understanding new construction in the City over the next twenty years, both the estimates of likely development and market demand are highly speculative. The table concludes with a reconciliation between citywide market demand and the sum of the likely developments throughout the City.

The summary of likely development at the ten growth areas leads to several conclusions concerning the amount and nature of this development.

- 95% of likely development in the growth areas is concentrated in six of the ten growth areas - Winkler Tract, Stone Tract, Arlandria East, King

Table 61
City of Alexandria
Likely Development Summary (1975 - 1995)

	Single Family (D.U.)	Garden Apts. (D.U.)	Elevator Apts. (D.U.)	Retail (GFA)	Office (GFA)	Motel/Hotel (rooms)	Industrial (GFA)	Total Residential (D.U.)	Total Non-Residential (GFA)
<u>POTENTIAL GROWTH AREAS</u>									
Winkler	0	0	6000	170,000	1,560,000	0	0	6000	1,670,000
Stone	150	0	3220	470,000	760,000	330	0	3370	1,395,000
King Street	180	0	1000	75,000	300,000	0	0	1180	375,000
Braddock Rd.	0	0	400	10,000	0	0	75,000	400	85,000
N. Waterfront	75	0	2150	140,000	815,000	400	36,000	2225	1,191,000
Potomac Center	0	0	2000	40,000	465,000	400	0	2000	705,000
Shirley Duke ³	0	0	0	0	0	0	0	0	0
Dip Commercial	0	0	0	0	188,000	425	0	0	401,000
Arlandria East	40	0	2740	126,000	834,000	0	0	2780	960,000
Arlandria West	0	320	0	0	0	0	0	320	0
Sub Total	445	320	17,510	1,031,000	4,862,000	1555	111,000	18,275	6,732,000
<u>CITYWIDE DEVELOPMENT OUTSIDE OF POTENTIAL GROWTH AREAS</u>									
Cameron Valley Study "Most Likely Projection"	0	0	8100	225,000	850,000	860	1,200,000	8100	2,675,000
Units Under Const. 1/1/75	50	750	3965	0	0	425	0	4765	213,000
Vacant Land Outside Study Areas	430	680	3610	400,000	1,500,000	0	0	4720	1,900,000
Sub Total	430	1430	15,765	625,000	2,325,000	1225	1,200,000	12,585	4,788,000
TOTAL	925	1750	33,185	1,656,000	7,187,000	2780	1,311,000	35,860	11,520,000
<u>ESTIMATED MARKET ABSORPTION 1975 - 1995⁴</u>									
Minimum Market Absorption Level	N.A.	N.A.	N.A.	235,000	3,337,500	550	2,600,000	27,550	---
Maximum Market Absorption Level	N.A.	N.A.	N.A.	590,000	6,000,000	2000	4,000,000	30,550	---
<u>DIFFERENCE BETWEEN TOTAL CITY LIKELY DEVELOPMENT LEVELS AND MARKET ABSORPTION LEVELS</u>									
Difference for Minimum Market Absorption Assumption				1,421,000	3,849,500	2230	-1,289,000	8,310	---
Difference for Maximum Market Absorption Assumption				1,066,000	1,167,000	780	-2,689,000	5,310	---

¹ D.U. = Dwelling Units, GFA = Gross Floor Area

² Each motel room is assumed to equal 500 square feet of gross floor area for purposes of summarizing non-residential gross floor area.

³ For purposes of this summary table, it is assumed that the north side of the Moore-Hill Tract will be acquired for park use, and therefore that no development will occur in this growth area.

Based on Citywide market absorption levels developed by, and based on data furnished by, the City of Alexandria, Virginia 1975-1992 and Northern Virginia Metro Region Council, as well as city and regional forecasts.

Street Station, Potomac Center and North Water-front. Major mixed use development (primarily elevator apartments and office with some retail and motel/hotel uses) is expected to occur within each of these 6 growth areas within the next twenty years.

- Only 5% of likely development in the ten growth areas will take place within Arlandria West, Shirley Duke/Regina Apartments, Dip Commercial and Braddock Road Station areas. Development here is expected to be relatively modest and will not be of a mixed use nature.
- 95% of new residential dwelling units will be in elevator buildings while 5% will be in single family and garden apartment structures.
- 72% of the gross floor area of expected commercial development at the ten growth areas will be devoted to office uses, 15% to retail uses, 11% to motel/hotel uses, and 2% to industrial uses.

Likely development at the ten growth areas can be further summarized by adding the gross floor area of the likely residential and commercial development at each growth area. Table 62 shows that half of the projected likely development is expected to occur in the two growth areas west of Shirley Highway -- the Winkler and Stone Tracts. The other half will be located along the Route 1/George Washington Parkway Corridor in the eastern end of the City. The table also points up the fact that more than three fourths of all construction is expected to be devoted to residential dwelling units.

Table 62

Residential and Commercial Likely Development
in the Potential Growth Areas

	Residential & Commercial Likely Development		Residential Likely Development		Commercial Likely Development	
	1000 /77 GFA	% of Total	1000 /77 GFA	% of Total	1000 /77 GFA	% of Total
Winkler Tract	8870	30.9	7200	81.2	1670	18.8
Stone Tract:						
Park Center	3078	10.7	1756	57.1	1322	42.9
Remainder	2360	8.2	2287	96.9	73	3.1
Total	5439	18.9	4044	74.4	1395	25.6
Arlandria E.	4296	15.0	3336	77.7	960	22.3
Arlandria W.	384	1.3	384	100.0	0	0
Shirley Duke/ Regina Apts.	0	0	0	0	0	0
Dip Commercial	401	1.4	0	0	401	100.0
King St. Sta.	1791	6.2	1416	79.1	375	20.9
Brad. Rd. Sta.	575	2.0	480	85.0	85	15.0
Potomac Center	3105	10.8	2400	77.3	705	22.7
N. Waterfront	3861	13.4	2670	69.2	1191	30.8
Total for Growth Areas	28,712	99.9	21,930	76.4	6782	23.6

¹ It is assumed that an average residential dwelling equals 1200 square feet of gross floor area.

Development will occur at some of the potential growth areas earlier than at others. The early phases of development at Park Center and North Waterfront are now underway. Several of the growth areas have specific development constraints that are holding up construction; all of the growth areas are subject to the whims of the residential and commercial construction markets. Development at Arlandria East will not occur until the completion of the Four Mile Run flood control project in 1979. Major development at King Street Station and Braddock Road Station might not occur until

the completion of METRO to the Huntington Station in 1980. The remaining growth areas will develop based primarily on market conditions, the competitive advantage of the developable sites located within the growth area, and owner/developer intentions. Table 63 displays the possible timing of residential and commercial development at the growth areas over the twenty year study period. The table assigns a development period for each growth area and assumes, in most cases, that residential and commercial development will be constructed at a constant pace. Although the table is a crude attempt at phasing likely development, the uncertainty of market demand precludes a more detailed analysis. The relatively slow rate of residential and commercial construction estimated for the 1975-1980 period reflects the large stock of dwelling units that will be entering the City housing market in 1975-1976 and the current oversupply of office space in the Washington Metropolitan Area.

The second section of Table 61 (Citywide Development Outside of Potential Growth Areas) estimates new development in the rest of the City. The Cameron Valley levels of development are drawn from the "most likely" projection of an ongoing City staff/Gladstone Associates study of the Cameron Valley. The next line of the table summarizes that development which was under construction as of January 1, 1975; most of this development is being constructed south of the Landmark Shopping Center. Lastly, estimated development levels for major parcels of vacant land were added to probable development in Alexandria's central business district to round out the development picture for the City. The subtotal of development outside the potential growth areas indicates that about half of the City's new construction over the next twenty years probably will occur outside the ten growth areas.

The concluding section of Table 61 presents the City staff/Gladstone Associates estimates of minimum and maximum market absorption levels for the seven land use types used in the study to describe new development. The amount of variation between the minimum and maximum market absorption levels indicates the uncertainty associated with projecting future development levels. For example, it is much more difficult to predict the amount of office space that can be absorbed in the City over the next twenty years than the

Table 63

Estimated Time of Completion of Likely Development
at the Potential Growth Areas

	Resid. D.U.'s	Commercial 1000's # GFA	Devel. Period	Residential Development (Dwelling Units)				Commercial Development (1000's of square feet) of Gross Floor Area			
				1975- 80	1980- 85	1985- 90	1990- 95	1975- 80	1980- 85	1985- 90	1990- 95
Winkler Tract	6000	1670	1977-95	1000	1667	1667	1666	278	464	464	464
Stone Tract: Park Center Remainder	1464	1322	1975-85	732	732	0	0	661	661	0	0
	1906	73	1985-95	0	0	953	953	0	0	37	36
Total	3370	1395	1975-95	732	732	953	953	661	661	37	36
Arlandria East & West	3100	960	1980-95	0	1033	1033	1034	0	320	320	320
Dip Commercial	0	401	1980-85	0	0	0	0	0	401	0	0
King St. Station	1180	375	1980-90	200	490	490	0	0	187	187	0
Braddock Rd. Station	400	85	1990-95	0	0	0	400	0	0	0	85
Potomac Center	2000	705	1985-95	0	666	666	667	0	235	235	234
North Waterfront	2225	1191	1975-95	556	556	556	557	298	298	298	297
Total for Growth Areas	18275	6782		2488	5144	5365	5277	1237	2566	1541	1436

number of elevator apartment dwelling units. The last two lines of the table present the difference between the sum of likely developments throughout the City and the minimum and maximum market absorption levels for 1975-1995. Likely developments throughout the City exceed the estimated minimum and maximum market absorption levels substantially in the three principal land use categories -- elevator apartments, retail, and office. Citywide office and residential likely development exceeds the assumed maximum market absorption rates by less than 20 percent. Estimated retail development exceeds the maximum market absorption level by 180 percent.

Although the Committee has predicted that more will be built than can be sold or rented, the difference is relatively small in all cases except for retail uses. Since the margin of error in estimating future development and market demand is so high, an adjustment of Citywide likely development to reflect assumed market absorption levels would be of little value. Market absorption levels for retail do not contemplate the possibility that Alexandria may capture a larger share of the Northern Virginia regional shopping center market than has been true historically. The 470,000 square feet of retail development assigned to vacant land outside the study areas reflect owner/developer intentions to capture a portion of the inside-the-beltway regional shopping center market. If these proposals are acted upon and succeed, then the retail market absorption levels assumed are much too conservative.

Citywide Population, Household and Employment Forecasts

City population, households, and employment were estimated for the period 1975-1995. These projections are the result of applying household size and employment factors to likely development throughout the City after that likely development was reduced to conform to the estimated citywide market absorption levels shown in Table 61. Figure 11 presents the 1960-1975 population trends in the three planning districts and in the City as well as projected population in the planning districts and the City for the next twenty years.

Figure 11 and Table 64 demonstrate that population increases will vary widely throughout the City. All of the

ten potential growth areas except Arlandria East and West are located in Planning Districts I and III. Most of the 6% population increase in Planning District II will come from the large mixed use development predicted for Arlandria East. Planning Districts I and III will experience substantial (68% and 52% respectively) increases in population because each contains several potential sites for major mixed use development.

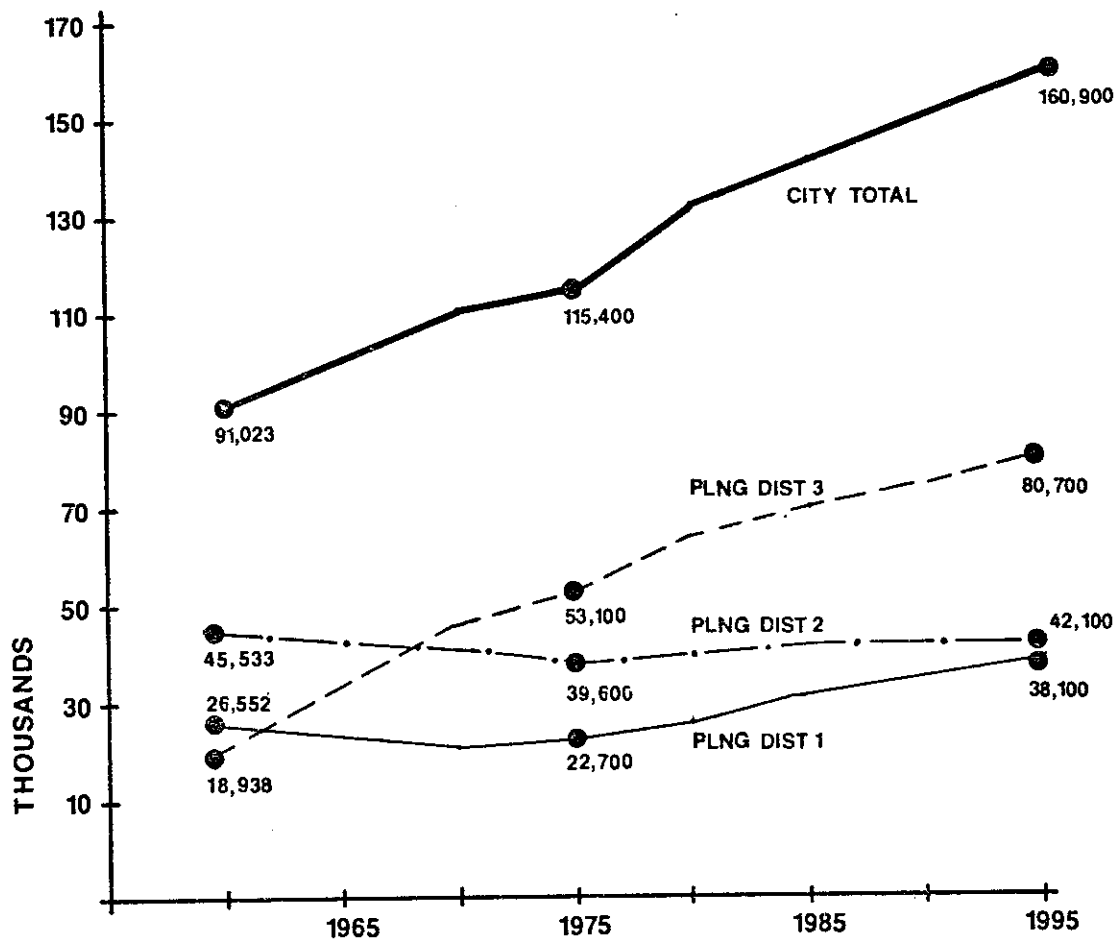


FIGURE II
POPULATION FORECAST, 1975-1995
THE CITY OF ALEXANDRIA

Planning District I includes North Waterfront, King Street Station, Potomac Center, and the eastern end of the Cameron Run Valley; Planning District III includes the Winkler Tract, Stone Tract, the Landmark area, and the western end of the Cameron Run Valley. The 39% increase in citywide population projected for the City for the next twenty years will mean an average annual rate of population growth slightly less than that of the 1960's.

Table 64

Projected Amount of Population Change for
the City of Alexandria (1975-1995)

	Estimated 1975	Estimated 1995	Change in Population	Percent Change in Population
Planning District I	22,700	38,100	+ 15,400	+ 68%
Planning District II	39,600	42,100	+ 2,500	+ 6%
Planning District III	53,100	80,700	+ 27,600	+ 52%
Total City	115,400	160,900	+ 45,500	+ 39%

Because 95% of these additional Alexandria residents will be housed in elevator apartments, the City will experience a major shift (currently underway) in the household characteristics of its population. The single-family life style that deominated Alexandria in 1960 may change by 1995 to the urban central city life style of elevator apartments.

Table 65

Composition of Alexandria Housing Stock (1960-1995)
(as a percent of total housing units)

	1960	1975	1995
Single Family	59.5	36.4	23.6
Garden Apartments	34.3	41.9	29.2
Elevator Apartments	2.7	19.7	45.7
Public	3.5	2.0	1.5

Not every neighborhood will be dwarfed by major high-rise residential development, but the characteristics and attitudes of the majority of Alexandrians will shift dramatically to reflect the outlook of apartment residents.

Households are expected to increase more rapidly than population because of the small household size of most elevator apartment units (Figure 12). Thus, while population is expected to increase 39% (from 114,500 to 160,900) from 1975 to 1985, the number of households is expected to increase 56% (from 48,600 to 75,000). The City's average household size will fall from its estimated 1975 level of 2.37 persons to 2.13 persons in 1995.

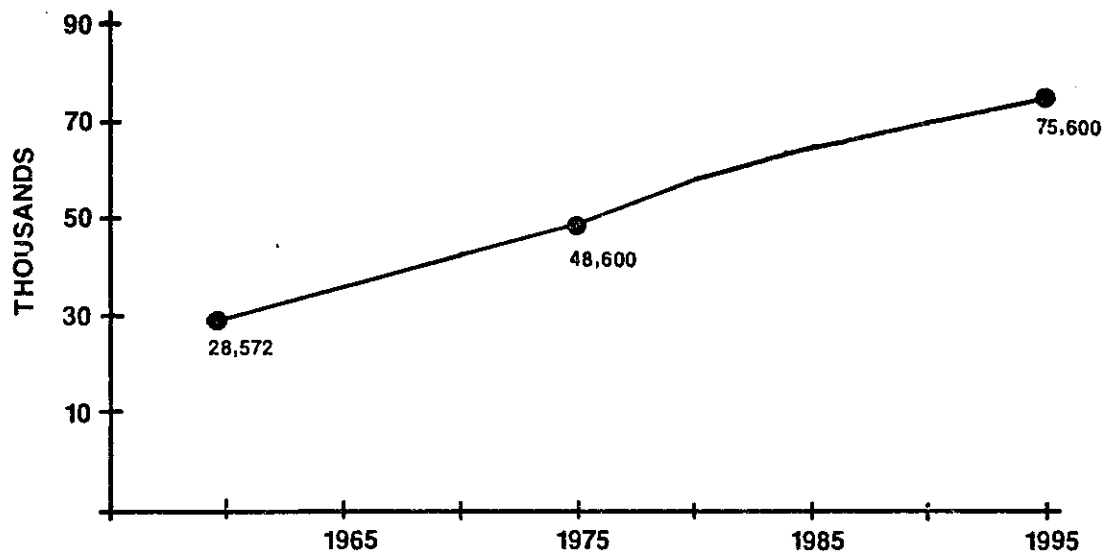


FIGURE 12
HOUSEHOLD FORECAST, 1975-1995
THE CITY OF ALEXANDRIA

The employment forecast for the City (Figure 13) depends upon the percentage of the region's office market that can be captured by Alexandria. Between 85 and 90% of the City's new jobs will be office in contrast to the historical reliance on retail trade, transportation and industry for major sources of employment. Approximately one-third of the projected office employment is expected to be with federal, state or local government. The low employment estimate assumes that Alexandria will capture approximately 10% of the Northern Virginia office market; the high employment estimate assumes that Alexandria will capture approximately 15% of it. Because federal policy regarding the construction and leasing of office buildings for federal use is uncertain and because demand for office space is volatile, the employment projections displayed in Figure 13 are much more speculative than the population and household projections previously discussed.

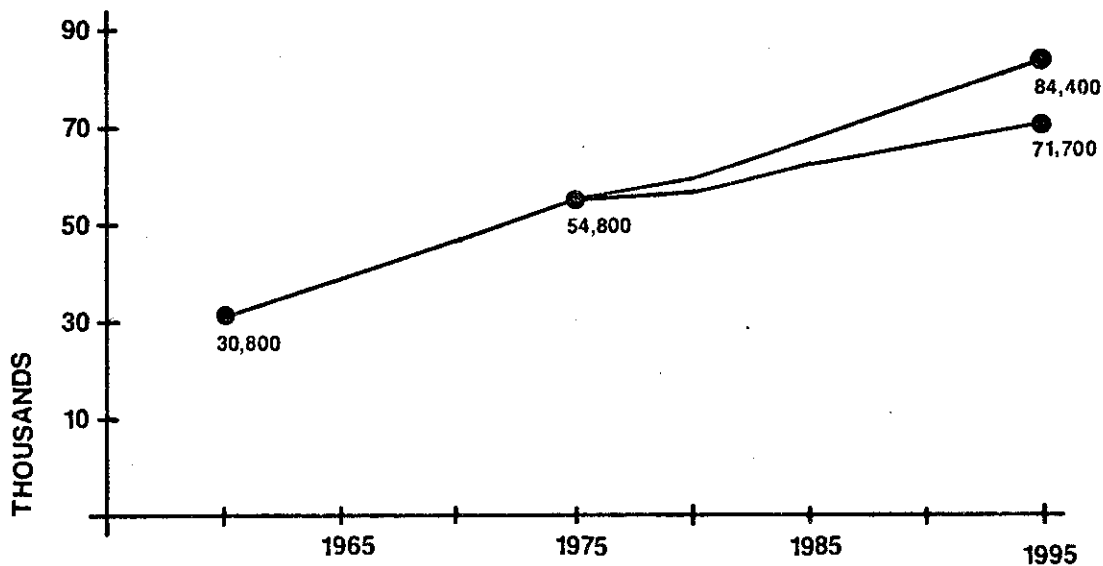


FIGURE 13
EMPLOYMENT FORECAST, 1975-1995
THE CITY OF ALEXANDRIA

Table 66 displays the annual rates of change for population, households and employment for selected intervals from 1960 to 1995. Of these three, the number of households is expected to increase the most rapidly during the twenty year study period. If one assumes that employment will increase at an average rate between the high and low projections, employment will increase at a slightly greater rate than population during the next twenty years. The rate of employment increase for 1975-80 is expected to be significantly lower than that for both the 1960-75 and 1980-95 periods because of the current oversupply of office space in the Washington Metropolitan Area. The rate of population and household increase for 1975-80 is significantly higher than for the 1980-95 period because of the large number of units under construction as of January 1, 1975.

Table 66

Population, Households, Employment -
Annual Rates of Change (%)

	1960-70	1970-75	1975-80	1980-85	1985-90	1990-95
Population						
Plng. Dist. I	- 1.9	0.5	3.7	2.8	2.5	2.2
Plng. Dist. II	- 0.6	- 1.6	0.7	0.5	---	---
Plng. Dist. III	14.5	2.9	4.3	1.7	1.6	1.4
Total City	2.2	0.8	2.9	1.5	1.3	1.2
Households	4.9	2.9	4.0	2.1	1.7	1.6
Employment ¹	4.5	4.5	1.1-1.8	1.6-2.7	1.5-2.4	1.4-2.2

¹ Two rates of change are given for 1975-1995 since a low and a high projection were made for this period.

Citywide Impacts of Likely Development

This section of the overview chapter considers the citywide and regional impacts of likely development at the ten potential growth areas. As discussed earlier, the sum of the likely development levels at the ten growth areas has not been adjusted to reflect the estimated market absorption levels for 1975-1995. The population, household and employment forecasts discussed in the previous section are the

Committee's best estimates based primarily on market demand for new construction. Estimates of impacts resulting from likely development at the ten growth areas primarily reflect the sum of developer/owner desires without adjustments for possible delay. Table 67 summarizes the principal quantifiable impacts of construction in the ten growth areas. The remainder of this section will be devoted to discussing 1) demographic and social impacts, 2) environmental and city services impacts, 3) transportation impacts, and 4) fiscal impacts.

A. Demographic Impacts

Over the twenty year study period, likely development at the ten growth areas will bring about substantial changes in the number and characteristics of the residents and employees in Alexandria. In contrast, the number of public school children added by likely development will be minor. Likely development at the ten growth areas will increase population by 25.4%, employment in the City by 43.2% and the number of public school children by 5.7%.

Based on assumptions about the characteristics of the new residential units that will be constructed at the growth areas, some generalizations can be made about the future City residents who will move into these units over the next twenty years. After considering the market experience of the last five years and the fact that a declining percentage of the population will be able to afford single-family dwelling units, the Committee has assumed that approximately 70% of the new apartment units will be condominium and 30% will be rental (this assumption is admittedly speculative but represents the Committee's best judgement under present conditions). If 70% of the new dwelling units constructed in the City in the next twenty years are owner-occupied, then the City's historic trend towards an increasing percentage of renters (62.2% in 1960, 74.0% in 1970, 75.1% in 1974) will be reversed. Although apartment dwellers are typically more transient than home owners, it is likely that condominium owners will be less transient than persons living in rental apartment units.

The majority of the future residents of the newly constructed apartment units will probably be single persons or married couples with no children living at home. A high percentage of these apartment residents will be between 25-34

Table 67
City of Alexandria: Summary of Impacts of the Likely Developments, Potential Growth Areas

	Winkler Tract										Totals	
	Tract	Stone Tract	Shirley-Duke Regina	Arlandria West	Arlandria East	Dip Commercial Station	King St. Station	Braddock Rd. Station	Potomac Center	North Waterfront		
Demographic Impacts												
Population	9,300	5,370	0	735	4,345	0	2,000	620	3,100	3,520	28,990 persons	
Employment	6,760	4,330	0	0	3,795	1,010	1,425	120	2,260	3,995	23,695 employees	
Schools K-6	78	84	0	30	47	0	64	5	26	49	383 P.S. Children	
7-8	30	25	0	6	14	0	19	2	8	15	119 P.S. Children	
9-10	30	28	0	5	17	0	20	2	10	17	129 P.S. Children	
11-12	42	33	0	4	22	0	21	3	14	21	160 P.S. Children	
Total	180	170	0	45	100	0	124	12	58	102	791 P.S. Children	
Environmental Impacts												
Sewage	801,000	572,000	0	48,500	395,500	103,000	181,000	49,000	340,000	420,000	2,910,000 gals./day	
Solid Waste	7,600	4,850	0	325	3,720	650	1,650	435	2,900	3,620	23,760 tons/year	
Water	839,600	615,000	0	51,500	416,000	108,000	197,000	51,000	356,000	441,000	3,076,500 gals./day	
Electricity	111,000	81,000	0	4,800	54,900	8,400	25,000	6,500	52,500	52,900	397,000 kilowatts	
Transportation Impacts												
Automobile Trips												
A.M., In	2,045	1,135	0	25	1,080	375	380	40	680	1,100	6,860 trips	
A.M., Out	1,170	750	0	80	635	125	230	65	430	605	4,090 trips	
P.M., In	1,820	1,660	0	110	1,075	150	425	90	600	1,015	6,945 trips	
P.M., Out	3,315	2,345	0	60	1,850	405	700	70	1,000	1,760	11,505 trips	
Transit Trips												
A.M., In	880	485	0	20	500	105	230	30	380	455	3,085 trips	
A.M., Out	1,030	610	0	55	400	45	275	75	440	410	3,340 trips	
P.M., In	1,430	930	0	75	585	55	390	105	590	585	4,745 trips	
P.M., Out	1,535	935	0	40	835	125	410	60	620	740	5,300 trips	
Pedestrian Trips	1,375	810	0	40	595	35	260	95	380	565	4,155 trips	
Parking Required by Zoning Ordinance	12,737	9,153	0	408	6,293	925	2,481	549	4,215	5,791	42,522 spaces	

or 45-64 years of age. Most young families will probably go to single family units in the far suburbs; few persons 65 years of age or older will be able to afford the new apartment units in the growth areas. Therefore, likely development at the growth areas probably will attract a disproportionate number of persons aged 25-34 and 45-64. Because the apartment units will be new and mostly bought, not rented, the majority of their occupants will be upper middle income persons employed in managerial and professional positions.

Since 95% of the likely development at the growth areas will be concentrated in large, mixed-use developments at six of the ten growth areas, there is a danger that the future residents of these developments will not relate to the City of Alexandria. The construction of large, self-contained, mixed-use developments within Alexandria might very well result in new residents of the City identifying only with their development. For this reason, steps must be taken to ensure that these new residents identify with the City and participate in the local political process.

Mixed-use development with elevator apartment units constructed at densities ranging from 50 to 80 dwelling units an acre means dramatic increases in population densities for certain sectors of the City. Currently, approximately 11,000 persons live in the 960 acres of land studied by the Committee as potential growth areas. The population density of the growth areas is now the same as that of the City, 11 persons an acre. In 1995, with 29,000 additional residents added by likely development, the growth areas will have an estimated population of 40,000 persons and a population density of 42 persons an acre. These high densities demand well planned City supporting services, particularly transportation, as will be discussed subsequently.

The impact of likely development on public school membership depends primarily on two factors: 1) whether birth rates continue to fall, stabilize, or increase over the next twenty years and 2) whether the current characteristics of typical single family, garden apartment, and elevator apartment unit households remain the same or whether more families with children will be forced to live in apartments because of the rising cost of housing. The public school membership projections below assume that birth rates and

household characteristics (within a given dwelling unit type) will not change significantly from 1975 to 1995. Table 68 shows the estimated number of public school children who will be added by likely development at the growth areas. Table 69 compares the estimated 1995 public school membership to gross capacity and optimum utilization capacity of the current school system.

Table 68

Public School Children Added
by Likely Development at Growth Areas

	Oct. 1, 1974 Membership	Public School Children Added by Likely Dev.	Percent Increase
K-6	7850	383	4.9%
7-8	2110	119	5.6%
9-10	2020	129	6.4%
11-12	1829	160	8.7%
<u>Total</u>	13809	791	5.7%

Table 69

Estimated 1995 Public School Membership
Compared to Existing School System Capacity

Grades	Oct. 1, 1974 Membership	Public School Children Added by Citywide Dev.	Est. 1995 Pub. School Membership	Existing Gross Capacity	Existing Optimum Utilization Capacity
K-6	7850	768	8618	10,380	8,500
7-8	2110	215	2325	3,510	2,987
9-10	2020	237	2257	3,222	2,909
11-12	1829	277	2106	2,131	1,965
<u>Total</u>	13809	1497	15306	19,243	16,361

Estimated 1995 public school membership should be regarded as a high estimate since it is quite possible that fewer public school children will live in the existing City housing stock. Public school membership will probably continue to decline in the short term (as it has since 1969) before it begins a slow rise to approximately 15,300 in 1996. This will result if birth rates remain relatively constant in the future while the number of households in the City continues to increase rapidly. Thus, although population will increase more than 41% over the twenty year study period, public school membership should increase by no more than 11%.

B. Environmental and City Services Impacts

1. Sewage Disposal System: The 2.9 million gallons a day of sewage that will be generated by likely development can be handled by the Alexandria and Arlington Treatment Plants as shown in Table 70:

Table 70

Sewage Added by Likely Development Compared to
Treatment Capacity Reserved for Alexandria
(Millions of Gallons a Day)

Treatment Plant	Present Flow	Sewage Added by Likely Dev.	Sum of Present & Likely Dev. Flow	Cap. Res. for City	Pres. & Likely Flow as % of Cap.
Alexandria	11.0	2.34	13.34	22.5	59%
Arlington	1.75	.57	2.32	3.5	66%

After the Arlandria line is upgraded, all interceptors in the City will be able to handle the additional sewage projected for likely development at the growth areas. If the actual level of development at Potomac Center were to exceed the likely development level by 2 or 3 times, then the developer, in order to obtain a permit, would be required to construct an interceptor directly to the sewage treatment plant.

2. Solid Waste Disposal System: Likely Development

at the growth areas is expected to produce 26,000 tons of solid waste a year, approximately one-third of what is currently handled at the City incinerator now operating at capacity. City Council has endorsed the closing of the City incinerator and the institution of an effective resource recovery program. Establishing an effective resource recovery program would accomplish both the efficient disposal of the City's solid waste and the extension of the Lorton landfill's life beyond the currently projected 16.5 years.

3. Water Supply System: The additional three million gallons of water a day that will be needed by the new developments at the growth areas represents a twenty percent increase over the present Alexandria daily usage of fourteen million gallons. It is probable that the City will have switched its water supply source from Occoquan Creek reservoir to the Potomac River (using either the Dalecarlia or the Fairfax County Potomac treatment facility) by the early 1980's. After that time, the City's water demand and any additional demand caused by City growth will place additional strain on the Potomac as a water source. The current maximum daily demand of those jurisdictions drawing on the Potomac as their water source (439 million gallons a day) already exceeds the record 1966 low flow (388 million gallons a day). Since the water demand of the jurisdictions now drawing from the Potomac has been increasing rapidly (a 10% increase in the last 3 years), the region's water supply problem will become increasingly critical in the future. Since it has no major reservoirs, the metropolitan region could experience a severe water shortage at any time. The Water Resources Planning Board of the Council of Governments began a two-year water resources study this summer. This plan must include provisions for pollution abatement which include consideration of all activities associated with point (e.g., sewage treatment plants) and non-point (e.g., urban run-off) sources of water pollution and must incorporate a regulatory management program. The plan will address both the water supply and water quality problems.

4. Energy Supply System: There are four major direct sources of energy for the City of Alexandria - electricity, oil, natural gas and gasoline. The transmission and distribution systems for these sources of power are not a constraint to new development at the growth areas. Estimated

growth over the next twenty years will require construction of a second VEPCO substation near the intersection of Braddock Road and the RF&P railroad tracks (tentatively scheduled for construction in 1980-1981). A third substation will probably be required in the west end of the City to support the development at the Winkler and Stone Tracts as well as the Landmark area and the west end of the Cameron Run Valley.

The continuing availability of energy supplies is a crucial international concern. The City should support the national goal to conserve energy by encouraging appropriate construction techniques and the reduction of automobile use. The sharp rise in the cost of energy will change living and travel patterns in the metropolitan area; it should increase the desirability of Alexandria as a place of work and residence.

5. Air Quality: Carbon monoxide from vehicle emissions is the principal air quality impact of development at the ten growth areas. Two of the growth areas (Winkler and Stone Tracts) could cause the federal primary standard of 35 ppm of CO to be exceeded if they were fully developed immediately because they are close to Shirley Highway and because development will be massive. The size of these tracts and the current economic situation make immediate full development unlikely so the City should not violate the federal primary standard for carbon monoxide in the foreseeable future, if the current federal schedule for the reduction of automobile emissions is adhered to. During 1972, 1973 and 1974, however, one-hour CO concentrations did reach annual peaks of 20, 18, and 21 ppm, respectively, at the monitoring station located on the roof of the City Health Department on St. Asaph Street (these measurements are probably conservative, since pollution is worse at ground level, along roads).

The Environmental Protection Agency (EPA) and the State Air Pollution Control Board could significantly affect the amount, timing and nature of development within the potential growth areas. Since January 1, 1975, the State Air Pollution Control Board has required that a permit be issued for all "indirect sources" generating more than the following number of automobile trips:

Inside Standard Metropolitan
Statistical Areas

1 Hour Standard	700
8 Hour Standard	1750

The Board can refuse to issue a permit to a developer or require him to modify his plans; the evaluation standards for these large development proposals are based primarily on vehicle emissions of carbon monoxide. Because it is possible that the state might revoke this indirect source permit requirement, it is difficult to assess the potential impact of the permit system on future development in the growth areas.

EPA has designated Northern Virginia as an Air Quality Maintenance Area (AQMA) for hydrocarbons because of the secondary pollutants (photo-chemical oxidants) produced from the interaction of hydrocarbon emissions and the air (note: approximately 85% of hydrocarbon emissions in Alexandria are produced by motor vehicles). Phase II of this AQMA program is aimed at achieving national secondary standards in hydrocarbons by 1985 and will address the full range of land use controls. Although the deadlines are now flexible, depending on the magnitude of the task involved in preparing the plans, the Phase II plan originally was to be submitted by the State to EPA no later than June, 1977. The land use controls developed by the State Air Pollution Control Board could have a significant impact on future development at the potential growth areas.

6. Noise Levels: Noise from the additional traffic generated by likely development will most severely impact the residential neighborhoods adjacent to the Route 1/George Washington Parkway Corridor. It is predicted that 900 additional automobile trips in the P.M. peak hour will be generated by likely development along the Route 1/George Washington Parkway Corridor. While most of the trips will be on the arterials in Planning District I, many will be crowded off, onto residential streets. Thus, people who live on residential streets as well as people who live on arterials will be bothered by more noise. A less serious impact of likely development is construction noise. This will be most severe when construction is adjacent to residential neighborhoods. Because there are numerous major existing noise sources in Alexandria (e.g., National Airport, RF&P rail

yards, Shirley Highway, etc.) new construction near these major noise sources should be designed to protect the residents and workers from harmful noise levels.

7. Parks and Recreation: If the existing ratio of 4.0 acres of parkland per 1,000 City residents is maintained at the growth areas, 116 acres of parkland will have to be created by the City and developers to meet the needs of the 29,000 residents added by likely development. If none of the 116 acres of parkland is added then the 4.0 acres of parkland per 1,000 City residents (City-wide) will fall to 3.2 acres per 1,000 City residents. 25% more residents will use the existing recreation facilities. This impact will vary from neighborhood to neighborhood.

C. Transportation Impacts

1. Methodology: The following tables and maps describe a relatively simple methodology for calculating the impact of P.M. peak hour auto trips generated by the likely development levels at the ten growth areas. Because traffic entering and leaving the various growth areas uses the same arterials to travel through the City, the full impact of the added automobile trips cannot be evaluated within the individual growth area context. With the exception of the Shirley Duke/Regina growth area (for which no likely development is projected), the growth areas are clustered along two principal transportation corridors in the City. The Winkler and Stone Tracts fall within the Shirley Highway Corridor, and the Arlandria East and West, Dip Commercial, King Street Station, Braddock Road Station, Potomac Center, and North Waterfront growth areas fall within the George Washington Parkway/Route 1 Corridor. Because of the distance that separates these transportation corridors, it can be reasonably assumed that development in one corridor will not substantially affect traffic conditions in the other corridor. It is important to note that this brief analysis of the traffic impact of the likely development levels addresses only automobile traffic during the afternoon peak hour. The afternoon peak hour was chosen for analysis because it represents the worst traffic conditions for most roads in Alexandria.

The amount of peak hour automobile traffic generated

by different types of development varies dramatically with such factors as whether staggered work hours are in effect, whether mass transportation is available, and whether the immediate area is conducive to walking and bicycling. North oriented person trips normally involve a higher percent of transit ridership than trips oriented to the south or west of Alexandria because there is better transit service toward the north. Retail development in some growth areas will attract walkers because they are neighborhood-oriented, while others will generate high automobile use since they are community or regional in scope. For each growth area, therefore, modal split assumptions (the modes being automobile, transit, and walking) have been made for each land use category, and, within each land use category, a distinction has been made between the modal splits for north-oriented trips and for other trips. For example, it is assumed that of the north-oriented residential trips entering or leaving North Waterfront, 50 percent will be by automobile, 40 percent by mass transit, and 10 percent by walking. South and west oriented residential trips, on the other hand, are expected to be 60 percent automobile, 30 percent transit, and 10 percent walking. Modal splits for offices in North Waterfront (and in all the other growth areas) assume more reliance on the automobile than is the case with residential land uses - 60 percent automobile, 30 percent transit, and 10 percent walking for north-oriented trips, and 75 percent automobile, 15 percent transit, and 10 percent walking for trips in other directions. The modal and directional split assumptions for all growth areas are shown by land use category in the appendix.

The ensuing analysis evaluates the traffic impact on certain arterial streets only and does not attempt to distribute traffic to all arterials or to local streets. Map 35 shows 39 segments of arterial streets that will be affected by the addition of growth area traffic. The capacities for these segments were determined using an estimating technique presented in the Metropolitan Washington Council of Governments' Transportation Planning Board Fall 1971 Technical Notes; the estimated capacities were then adjusted by City staff to reflect local conditions such as problem intersections. Existing traffic flows at the P.M. peak hour were obtained. The Director of Transportation and Environmental Services estimated a level of service for each arterial segment in order to describe the present traffic



CITY OF ALEXANDRIA

EXISTING TRAFFIC CONDITIONS

ON ARTERIES AFFECTED BY LIKELY DEVELOPMENT (P.M. RUSH HOUR)

LEGEND

- LEVEL OF SERVICE A-B
- - - - - LEVEL OF SERVICE C-D
- LEVEL OF SERVICE E-F
- MAJOR PROBLEM INTERSECTIONS
- AREA NOT STUDIED

Table 71

Existing P.M. Rush Hour Traffic Conditions
on Arteries Affected by Likely Development North or South or Level

George Washington Parkway/Route 1 Corridor		West Bound	East Bound	of Service
1. G.W. Parkway	North of Potomac Center Entrance	890	2440	C
2. G.W. Parkway	Potomac Center Entrance to Slaters	636	N.A.	C
3. G.W. Parkway	Slaters to Montgomery	613	1529	D
4. Washington Street	Montgomery to Gibbon	1308	1395	D
5. G.W. Parkway	Gibbon to City Line	635	2336	D
6. Route 1	City Line to Reed	565	1585	C
7. Route 1	Reed to Bellefonte	648	1192	C
8. Route 1	Bellefonte to Montgomery	956	1409	E
9. Route 1	Montgomery to Duke	871	1697	B
10. Route 1	Duke to Gibbon	N.A.	N.A.	C
11. Route 1	Gibbon to City Line	1340	2582	E
12. Mt. Vernon	City Line to Russell	477	1077	F
13. Mt. Vernon	Russell to Glebe	884	both ways	C
14. Glebe Road	City Line to Commonwealth	456	683	C
15. Braddock Road	Commonwealth to Mt. Vernon	N.A.	N.A.	C
16. Braddock Road	Mt. Vernon to West	491	176	E
17. King Street	Upland to Russell	404	388	C
18. King Street	Russell to Washington	530	553	F
19. Callahan Drive	King to Duke	349	501	E
20. Diagonal Road	King to Duke	N.A.	N.A.	E
21. Duke Street	Telegraph to Elizabeth	1399	1277	E
22. Duke Street	Elizabeth to Washington	N.A.	N.A.	E

Table 72

Existing P.M. Rush Hour Traffic Conditions
on Arteries Affected by Likely Development

Shirley Highway Corridor		NW or NE or SW Bound SE Bound Service		Level of
Street Name	Segment	NW Bound	NE Bound	Service
1. King Street	City Line to N. Beauregard	815	778	E
2. King Street	N. Beauregard to N. Hampton	767	752	E
3. King Street	N. Hampton to Shirley	N.A.	N.A.	E
4. King Street	Shirley to Quaker	516	464	C
5. Braddock Road	N. Beauregard to N. Hampton	260	347	B
6. Braddock Road	N. Hampton To Quaker	700	400	B
7. Seminary Road	City Line to N. Beauregard	770	1165	C
8. Seminary Road	N. Beauregard to Southern Towers Entrance	N.A.	N.A.	C
9. Seminary Road	Southern Towers Entrance to Shirley	N.A.	N.A.	C
10. Seminary Road	Shirley to N. Howard	1100	800	B
11. Walter Reed Drive	City Line to King	229	443	E
12. N. Beauregard St.	King to Seminary	175	370	B
13. N. Beauregard St.	Seminary to Winkler Entrance	1022	N.A.	B
14. N. Beauregard St.	Winkler Entrance to City Line	592	457	B
15. Shirley Highway	Quaker to King	6203	2816	D
16. Shirley Highway	King to Seminary	N.A.	N.A.	D
17. Shirley Highway	Seminary to Duke	5996	2863	C

conditions in the transportation corridors (Map 35, Tables 71 and 72). The level of service concept includes such factors as speed and travel time, traffic interruptions, freedom to maneuver safely, driving comfort and convenience, and the driver's operating costs. The concept is broken down to six levels of service as defined below:

Level of Service A describes the condition of free flow with low volumes and high speeds. Traffic density is low, with speeds controlled by driver desires, speed limits, and physical roadway conditions. There is little or no restriction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds with little or no delay.

Level of Service B is the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation. Reductions in speed are not unreasonable, with a low probability of traffic flow being restricted. The lower limit (lowest speed, highest volume) of this level of service has been associated with service volumes used in the design of rural highways.

Level of Service C is still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. Most of the drivers are restricted in their freedom to select their own speed, change lanes, or pass. A relatively satisfactory operating speed is still obtained, with service volumes perhaps suitable for urban design purposes. The City of Alexandria attempts to achieve this level of service during rush hour periods in designing new roads or road improvements.

Level of Service D approaches unstable flow, with tolerable operating speeds being maintained though considerably affected by changes in operating conditions. Fluctuations in volume and temporary restrictions to flow may cause substantial drops in operating speeds. Drivers have little freedom to maneuver and comfort and convenience are low, but conditions can be tolerated for short periods of time.

Level of Service E cannot be described by speed alone, but represents operations at even lower operating speeds than in level D, with volumes at or near the capacity of the highway. At capacity, speeds are typically, but not always, in the neighborhood of 30 mph on freeway facilities. Flow is unstable, and there may be stoppages of momentary duration.

Level of Service F describes forced flow operating at low speeds, where volumes are below capacity. These conditions usually result from queues of vehicles backing up from a bottleneck. The section of highway will be serving as a storage area during parts or all of the peak hour under this condition. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion. In the extreme, both speeds and volume can drop to zero.

Tables 73 and 74 summarize the inbound and outbound trips generated by the likely development as they cross the boundaries of the traffic corridors. These automobile trips were distributed over the 39 segments of the arterials under study in order to develop an estimate of automobile traffic added by the likely developments to each segment at the 1995 P.M. peak hour. The distribution of the traffic to various arterial segments was governed by the directional split assumptions which are detailed in the appendix. Because a significant shift in the location of jobs in the region over the next 20 years is not expected, and because the Metro system has been designed to support a high concentration of center city jobs, this analysis has generally assumed a continuation of the current directional orientation of traffic.

The capacities of the segments were adjusted to account for capital improvements and other changes over the 20-year study period; future levels of services, based on the existing traffic volumes and the 1995 added traffic from the potential growth areas, were then estimated by the Director of Transportation and Environmental Services. It should be noted that the 1995 traffic volumes do not take into account expected growth in Fairfax County; therefore, the identified future levels of service are conservative. An additional conservative element in the methodology is the assumption of a relatively high degree of use of mass transit (up to 50% in some areas), which is based on the assumption

Table 73

George Washington Parkway/Route 1 Corridor

Summary Table of in/out P.M. Peak Hour Auto Trips Added by Likely Development

	Arlandria East & West		Potomac Center		Dip Commercial		King St. Station		Braddock Rd. Station		North Waterfront Rt. 1 Corridor		Total G.W. Parkway/	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
North - G.W. Parkway Route 1	-- 502	-- 537	195 86	183 110	62 20	73 41	101 75	103 92	30 14	17 11	278 164	279 214	666 861	655 1005
South - G.W. Parkway Route 1	62 196	161 536	30 107	83 291	10 38	37 132	26 18	60 54	4 13	4 13	59 182	154 515	191 554	499 1541
West - Braddock Road	--	--	25	47	3	17	22	35	4	3	46	86	100	188
Southwest														
King Street	--	--	52	95	5	34	48	75	10	7	100	179	215	390
Duke Street	--	--	107	191	15	71	139	280	18	14	189	344	468	900
Glebe Road	237	382											237	382
Other ¹	186	296											186	296
TOTAL	1183	1912	602	1000	153	405	429	699	93	69	1018	1771	3478	5856

¹ Includes Russell Road, Commonwealth Avenue and Mount Vernon Avenue

Table 74

Shirley Highway Corridor

Summary Table of in/out P.M. Peak Hour Auto Trips
Added by Likely Development

	Stone Tract		Winkler Tract		Total Shirley Highway Corridor	
	In	Out	In	Out	In	Out
North, Northeast, Northwest						
Shirley Highway	362	299	422	349	784	648
S. Walter Reed Drive	224	223	232	248	456	471
King Street	292	433			292	433
Seminary Road			356	656	356	656
South, Southeast, Southwest						
N. Beauregard Street	17	35	22	58	39	93
Shirley Highway	288	561	278	844	566	1405
Seminary Road			508	1158	508	1158
King Street	293	462			293	462
Braddock Road	184	332			184	332
TOTAL	1160	2345	1818	3313	3478	5658

that gasoline costs and environmental conditions, coupled with the new Metro system will increase future use of transit.

2. Principal Findings of the Traffic Impact Analysis:

a. In the Shirley Highway corridor, only the segments at King Street west of Shirley and Walter Reed Drive are now at level of service E or F (of a total of 17 segments which will be impacted). In the George Washington Parkway/Route 1 corridor, 10 of 22 segments are already at levels of service E or F. The total auto trips added by the likely developments (including traffic added at certain City portals by the Cameron Valley likely development) will cause most remaining segments of major arteries in the City to be pushed well beyond their capacities (Tables 75 and 76, Map 36), creating extremely congested traffic conditions even if these road segments in the future carry no additional traffic originating from other jurisdictions or other sources within the City. In the Shirley corridor, the number of road segments with traffic flow at levels of service E or F will increase from four to eight. In the George Washington Parkway/Route 1 corridor, the number of road segments at these congested levels of service will increase from ten to nineteen.

b. Because of congested conditions on these major arteries, much of the traffic generated by the expected developments will divert to local streets in neighborhoods adjacent to the growth areas. For example, because of congested conditions on Washington Street and Route 1, traffic leaving North Waterfront will tend to use the north-south streets through Old Town and Census Tract 16 to reach the southern edge of the City.

c. Approximately 50 percent of the total traffic is generated by the 17 percent of the total floor area of development which is expected to be devoted to office uses (Table 77). In contrast, approximately 33 percent of the traffic is generated by the 75 percent of the total floor area of development which is expected to be residential. Office development produces more (i.e., higher peaking) traffic than an equal amount of residential development because there are 3.3 times as many office employees in each 1,000 square feet of office development as there are residents in 1,000 square feet of residential development.

Table 75

1995 P.M. Rush Hour Traffic Conditions on Arteries
Affected by Likely Development¹

George Washington Parkway/Route 1 Corridor		Traffic Added by Likely Development		Traffic Added by Cameron Run Valley Development		1995		Level of	
		NW or SW Bound	NE or SE Bound	NW or SW Bound	NE or SE Bound	NW or SW Bound	NE or SE Bound	Service	
1.	G.W. Parkway	655	666	265	316	F	F		
2.	G.W. Parkway	*	*	*	*	F	F		
3.	G.W. Parkway	*	*	*	*	F	F		
4.	Washington St.	*	*	*	*	F	F		
5.	G.W. Parkway	191	499	*	*	F	F		
6.	Route 1	880	753	95	123	F	F		
7.	Route 1	*	*	*	*	F	F		
8.	Route 1	*	*	*	*	F	F		
9.	Route 1	*	*	*	*	F	F		
10.	Route 1	*	*	*	*	F	F		
11.	Route 1	*	*	*	*	F	F		
12.	Mt. Vernon Ave.	554	1541	*	*	F	F		
13.	Mt. Vernon Ave.	125	108	53	63	F	F		
14.	Glebe Road	125	108	*	*	D	D		
15.	Braddock Road	382	237	*	*	D	D		
16.	Braddock Road	188	100	*	*	C	C		
17.	King Street	*	*	*	*	F	F		
18.	King Street	390	215	*	*	E	E		
19.	Callahan Drive	*	*	*	*	F	F		
20.	Diagonal Road	*	*	*	*	F	F		
21.	Duke Street	900	468	502	413	F	F		
22.	Duke Street	*	*	*	*	F	F		

¹ No attempt has been made to assign traffic to road segments inside the corridor screen-lines.

² Levels of service for internal segments are estimated. 1995 level of service estimates are based on projected additional traffic from development at ten growth areas and the Cameron Run

Table 76

1995 P.M. Rush Hour Traffic Conditions on Arteries
Affected by Likely Development

Shirley Highway Corridor		Traffic Added by Likely Development		Traffic Added by Cameron Run Valley Development		1995 ²	
Street Name	Segment	NW or SW Bound	NE or SE Bound	NW or SW Bound	NE or SE Bound	Level of Service	
1. King Street	City Line to N. Beauregard	433	292	125	94	D	
2. King Street	N. Beauregard to N. Hampton	580	430	*	*	D	
3. King Street	N. Hampton to Shirley	943	1322	*	*	E	
4. King Street	Shirley to Quaker	293	462	*	*	D	
5. Braddock Road	N. Beauregard to N. Hampton	111	103	*	*	C	
6. Braddock Road	N. Hampton to Quaker	184	332	*	*	C	
7. Seminary Road	City Line to N. Beauregard	656	356	119	83	E	
8. Seminary Road	N. Beauregard to S. Towers Ent.	1208	2351	*	*	E	
9. Seminary Road	Southern Towers Ent. to Shirley	1208	2351	*	*	F	
10. Seminary Road	Shirley to N. Howard	508	1158	*	*	C	
11. Walter Reed Drive	City Line to King	456	471	*	*	C	
12. N. Beauregard St.	King to Seminary	370	376	*	*	C	
13. N. Beauregard St.	Seminary to Winkler Entrance	38	2102	*	*	E	
14. N. Beauregard St.	Winkler Entrance to City Line	93	39	*	*	C	
15. Shirley Highway	Quaker to King	784	648	158	193	F	
16. Shirley Highway	King to Seminary	983	637	*	*	F	
17. Shirley Highway	Seminary to Duke	1405	566	*	*	F	

¹ No attempt has been made to assign traffic to road segments inside the corridor screen-lines

² Levels of service for internal segments are estimated. 1995 level of service estimates are based on projected additional traffic from development at ten growth areas and the Cameron Run Valley alone.

Summary Table of in/out P.M. Peak Hour Auto Trips
Added by Likely Development

Summary Table of Gross Floor Area of Likely Development (1975 ~ 1995)

Gross Floor Area of Likely Development Compared to P.M. Peak Hour Auto Trips Added

	Residential	Retail	Office	Motel	Industrial	Total
Citywide - % of Total Auto Trips Added	33.7	13.2	49.5	3.4	0.2	100.0
Citywide - % of Total Sq. Ft. GFA Added by Likely Development	76.4	3.6	16.9	2.7	0.4	100.0

d. In the evening rush hour, most Alexandria office traffic goes south, and most residential traffic comes in from the north. Therefore office uses located in the southern part of the City, and residential developments located in the northern part of the City, result in less internal traffic.

e. To encourage walk-to-work possibilities within mixed use developments, such developments should contain residences of a number and cost approximately corresponding with the number and likely pay scales of site employees. However, because of the high peaking of office generated trips and because the great majority of office trips will always involve modes other than walking, promotion of mixed use developments in proportions conducive to walk-to-work will also generate many auto trips.

f. It is expected that more Alexandria residents (20-50 percent, depending on the growth area and the direction of travel) will ride mass transit in 1995 than will Alexandria workers (10-35 percent), because the radial regional Metro system has been designed to serve the employment centers in Arlington and D.C. For example, riding public transit to work will be easier for Alexandria residents going to Washington than for Fairfax residents coming here to work in offices.

D. Fiscal Impacts

The Revenue-Expenditure Impacts Summary (Table 78) shows the approximate fiscal impact on the City budget (as of 1995 in 1974 dollars) from the ten growth areas. All of the growth areas show positive revenue-expenditure ratios (i.e., predicted City revenues exceed predicted City expenditures). The revenue-expenditure ratios vary from 1.06 (Arlandria West) to 3.77 (Dip Commercial). These variations are caused primarily by the following factors: 1) the varying numbers of public school children contributed by different dwelling unit types, 2) the relationship of the local sales tax and business, professional licenses to commercial land use categories and 3) the need for capital improvements at each of the growth areas. Table 79 shows that for residential land uses, elevator apartments result in the most favorable revenue-expenditure ratio, garden apartments the next most favorable and single-family units are the least favorable. This is true even though property taxes are much higher from typical

Table 78

Potential Growth Areas
Revenue-Expenditure Impacts Summary

Growth Area	Dollar Amounts in \$1,000's			
	Annual Revenues	Annual Expenditures	Annual Net Diff.	Revenue-Expend. Ratio
<u>Winkler Tract</u>				
Including general debt service	\$6359	3119	3240	2.04
Excluding general debt service	6359	2597	3762	2.45
<u>Stone Tract</u>				
Including general debt service	4338	2007	2331	2.16
Excluding general debt service	4338	1700	2638	2.55
<u>Shirley-Duke/Regina</u>				
None	0	0	0	0
<u>Arlandria West</u>				
Including general debt service	284	268	16	1.06
Excluding general debt service	284	233	51	1.22
<u>Arlandria East</u>				
Including general debt service	3122	1411	1711	2.21
Excluding general debt service	3122	1204	1918	2.59
<u>Dip Commercial</u>				
Including general debt service	317	84	233	3.77
Excluding general debt service	317	73	244	4.34
<u>King Street Station</u>				
Including general debt service	1449	834	615	1.74
Excluding general debt service	1449	722	727	2.01
<u>Braddock Road Station</u>				
Including general debt service	361	192	169	1.88
Excluding general debt service	361	161	200	2.24
<u>Potomac Center</u>				
Including general debt service	2274	1050	1224	2.17
Excluding general debt service	2274	830	1444	2.74
<u>North Waterfront</u>				
Including general debt service	3067	1339	1728	2.29
Excluding general debt service	3067	1122	1945	2.73
<u>City Wide Total</u>				
Including general debt service	21,751	10,304	11,267	2.09
Excluding general debt service				

In all growth areas except Braddock Road and North Waterfront, 50% of the dwelling units were assumed to be medium-price and 50% luxury. In Braddock Road all units were assumed to be medium-price; in North Waterfront, all were assumed to be luxury.

garden apartment units generate only $\frac{1}{4}$ th and elevator apartments $\frac{1}{20}$ th of the number of public school children generated by single family dwellings.

Table 79

Annual Revenues and Expenditures¹
(in constant 1974 dollars, per unit or per 1,000
square feet of gross floor area)

	Single Family (D.U.)	Garden Apt. (D.U.)	Elev. Apt. (D.U.)	Retail (1000 ψ GFA)	Office (1000 ψ GFA)	Hotel/ Motel (Units)	Indus. (1000 ψ GFA)
Revenue ²	\$1501	\$813	\$797	\$1429	\$563	\$496	\$370
Expend. (with current debt service)	\$1488	\$700	\$341	\$ 76	\$161	\$ 19	\$ 51
Ratio	1.01	1.16	2.33	18.91	3.50	26.25	7.26
Expend. (without current debt service)	\$1369	\$591	\$268	\$ 52	\$110	\$ 13	\$ 35
Ratio	1.10	1.38	2.98	25.57	5.11	38.29	10.58

¹ Expenditures include neither capital costs associated with growth areas nor the estimated contribution to the bus deficit since these factors vary from growth area to growth area.

² Residential revenues are in terms of medium-priced units: \$60,000 for single family dwelling units, \$34,700 for garden apartments, and \$37,250 for elevator apartments.

The local sales tax and business, professional licenses provide approximately 11% of the City's revenue. Since these revenues are collected almost entirely from retail and hotel land uses, these land-use categories have extremely high revenue-expenditure ratios of 27.57 and 38.29 respectively. Since office

and industrial land uses have neither the advantage of the highly lucrative revenue sources of local sales tax and business, professional licenses, nor the liability of being charged for the operation of the public school system, their revenue-expenditure ratios fall between the residential and the retail/hotel revenue-expenditure ratios. Unlike less developed suburban jurisdictions such as Prince William or Loudoun Counties, Alexandria has most of the transportation, sewer and water systems in place to support dense development. Therefore, the projected City capital costs associated with likely development at the growth areas are a relatively minor expenditure item.

The variation in the revenue-expenditure ratios among the growth areas is the result of the varying mixes of land-use categories. Those growth areas with high percentages of retail and hotel uses and, to some degree, office and elevator apartment units, therefore, have high revenue-expenditure ratios. Development at a growth area such as Dip Commercial is desirable only to the degree that it is composed of a high percentage of land uses that have high revenue-expenditure ratios. Most of the capital improvements needed to support intensive development at the growth areas are already in place. Thus, the expenditure-revenue analysis does not assist one to determine which of the growth areas should be encouraged to develop and which should not. It is reasonable to conclude from the analysis that mixed-use, high density development at the growth areas will generate more City revenues than City expenditures, given present conditions. The principal unknown in the expenditure-revenue impact of likely development of the growth areas are the future capital and operating costs of providing mass transit to major, intensive mixed-use development. Development at the scale assumed for determining likely development at the ten growth areas requires a high level of mass transit service.

Overall Recommendations

This chapter of the report presents the Committee's overall recommendations to the City Council. The recommendations are organized around five areas of concern: 1) the location and density of development, 2) transportation, 3) building heights, 4) the environment, and 5) community and recreational facilities. The recommendations are expressed

in terms of broad policy statements each followed by one or more proposed City Actions which would assist in the implementation of the policy. The listings of actions following each of the policy statements include alternatives available to City Council. They are meant only to suggest the types of implementation strategies available and in no way are exhaustive or represent a comprehensive implementation strategy.

Central to the charge of this Committee and to the formulation of recommendations is the idea that certain tracts of vacant and underutilized land in the City are particularly well suited to intensive, mixed-use development. The Committee has concluded that seven of the ten growth areas have significant mixed-use development potential. An examination of vacant and redevelopable parcels in Alexandria and of the twenty-year new construction market indicates that there is more than enough land in the City to support new development expected from 1975 to 1995. The City should assure that development of the appropriate type and density occurs at those locations where the impact will be least unfavorable.

A. General Recommendation on the Location and Intensity of Development

1. Policy: The City should increase its ability to guide and control development within Alexandria.

Actions:

- Make the CO zone more attractive for development than other City zones by reducing the FAR's of the C-2, C-3, I-1, and I-2 zones to the 2.0 FAR permitted by right in the CO zone.
- Encourage rezoning into CO of all portions of growth areas where there is significant mixed use development potential.
- Make the CO zone more attractive by providing more specific and clear criteria indicating what the City will require of CO developments.

2. Policy: In new developments the City should encourage large dwelling units suitable for family occupancy, ownership in preference to rental units, and provision of units for moderate-income families.

Actions:

- Reduce to 3.0 the maximum FAR ceiling for CO developments not qualifying for FAR bonus increments.
- Provide FAR bonuses in increments of .25 up to a maximum ceiling of 4.0 for incorporating desired dwelling unit features in site plans.

3. Policy: As a rule, the City should encourage development of vacant land and of unintensively used commercial and industrial properties in preference to redevelopment of existing residential properties.

Actions:

- Refuse rezonings to higher density zones where they will result in redevelopment of older residential properties.
- Specifically, retain existing residential properties in the Shirley-Duke/Regina, Arlandria West, and Braddock Road Station growth areas.
- Establish apartment conservation programs encouraging rehabilitation of existing rental properties.
- Assist in parcel assemblage of marginal commercial and industrial properties in the Metro Station areas, where such uses are blighting influences.

B. Recommendations on Transportation

1. Policy: The City should encourage increased use of mass transit and should assure that new development within the City is so planned that it maximizes use of the Metro system.

Actions:

- Seek continuation and expansion of the Shirley express bus program, including establishment of stopping points in the Winkler and Stone growth areas.
- Expand exclusive bus lanes within the City.
- Encourage Winkler and Stone Tract developers to provide bus shelters on site.
- Develop a transit system linking population and employment centers (including growth areas) with Metro stations in Planning District I.
- Encourage the Potomac Center developer to provide a Metro station on site.

- Encourage the National Capital Planning Commission to incorporate a policy of locating new federal employment centers at Metro stations and within large, mixed-use developments.
- Require major developments to submit a traffic impact statement for site plan review.
- Encourage Metro to improve its information services.

2. Policy: The City should encourage other non-automobile forms of transportation, such as walking and bicycling.

Actions:

- Require internal bikeway/pedestrian path systems in large developments.
- Provide for easier pedestrian and bicycle access to new developments.
- Provide pedestrian walkways connecting the planned employment centers at Stone and Winkler Tracts with residential developments east of Shirley Highway.
- Construct pedestrian and bike paths in the Metro buffer strip along the west edge of Planning District I and along the waterfront in the eastern part of this Planning District.
- Promote balanced, mixed-use development to encourage walk-to-work.

3. Policy: Recognizing the regional nature of Alexandria's traffic problems (the majority of rush hour trips on thoroughfares and major arteries are trips of non-residents), the City should encourage policies which will lead to less commuter reliance on the automobile.

Actions:

- Endorse (through COG or independently) restrictive parking regulations, encouragement of car-pooling, and other area-wide policies which will help reduce automobile use.
- Restrict easy use of local streets by through traffic.
- Encourage staggered working hours at office developments.

4. Policy: The City should limit future street improvements and road widenings to the minimum necessary to

prevent creation of major bottlenecks near access points of new developments, with the possible exception of the relocation of Route 1.

Actions:

- Undertake the specific road improvements discussed in the preceding individual area chapters.
- Seek early completion of the study of a need for a relocated, restricted-access Route 1, possibly the only answer to the severe traffic congestion which disrupts neighborhoods in Planning District I.

C. Recommendations on Building Heights

Policy: The City should adopt height limitations which reflect sensitivity to the characteristics of neighborhoods near the growth areas and to other unique aspects of location.

Actions:

- Reduce the existing height limit in the entire Dip Commercial and Braddock Road Station growth areas.
- Within all other areas, require varying heights scaled upward away from existing residential development.

D. Recommendation on Urban Design

1. Policy: The City should establish special staff design review of developments to assure that they consider such things as "gateway" locations, vistas, monuments, and historic buildings.

E. Environmental Recommendations

1. Sewage System Policy: The City should require developers to upgrade sewer lines where necessary.

2. Water Supply Policy: The City should participate with other area jurisdictions in efforts to establish supplementary sources of water supply and should attempt to reduce per unit residential and non-residential water consumption.

Actions:

- Eliminate the current decreasing per unit water charges with increasing consumption and seek reversal of present rate structure which currently has decreasing per unit charges.
- Tax water bill of non-residential uses for full amount of the bill rather than for only the first \$150.
- Through the Water Resources Planning Board support regional water quality improvement efforts which will allow the metropolitan area to rely on the upper Potomac estuary as a supplementary water source.

3. Solid Waste Policy: The City should try to reduce the amount of solid waste generated within the City and should dispose by landfill of any waste which cannot be recycled.

Actions:

- Support expansion of the resource recovery program now in the experimental stage at the Lorton landfill site.
- Continue City policy of encouraging separation of types of solid waste (e.g., newspaper collections) to expand the City's resource recovery program.

4. Vegetation Policy: The City should attempt to maintain or improve the present balance of people to vegetation.

Actions:

- Strengthen the landscape ordinance to encourage that the maximum number of trees above a certain diameter be retained on development sites.
- Require that trees of a certain diameter removed to allow construction be replaced with plantings on site or along streets bordering the development.
- In areas lacking street trees, require that developers make street tree plantings to City specifications.
- Require more tree planting on parking lots.

5. Noise Policy: The City should try to reduce existing noise, should prevent significant increases in noise, and should assure that new developments are not adversely affected by existing noise sources.

Actions:

- Adopt a strong noise control ordinance.
- Modify building codes to require that new construction within the airport's NEF-30 zone be insulated to protect against excessive noise disturbance to residents and employees.
- Prohibit residential construction within NEF-40 zone.
- In areas near major arteries, Metro, rail lines, and other ground level noise sources, modify building codes to require noise buffers and setbacks to reduce noise penetrating sites to or below levels as defined as acceptable by federal standards.

6. Policy on Steep Slopes: The City should seek to preserve the scenic resources of steep-sloped areas.

Action:

- Prohibit construction on slopes of more than 20 percent.

7. Policy on Energy: The City should seek to reduce per capita energy consumption.

Actions:

- Require that buildings be designed and constructed so that less energy is needed for heating and cooling.
- Support reexamination of energy rate structures to encourage energy conservation.
- Support use of solid waste as a potential energy source.

8. Policy on Storm Water: The City should assure that new developments do not increase run-off rates in upper parts of drainage basins.

Actions:

- Require on-site retention of storm water where there is an apparent problem with flooding downstream.
- Encourage developers to integrate temporary ponding areas into developments in an aesthetically pleasing way.
- In appropriate areas, and especially in groundwater recharge areas, require that temporary ponding be over pervious material to allow as much as possible of the water to be absorbed into the ground.

9. Policy on Air Quality: The City should continue to encourage the reduction of air pollution within the City.

Actions:

- Continue efforts to ensure Pepco's timely adherence to EPA's compliance order on particulate emissions.
- Switch from incineration to landfill method of waste disposal, as approved by City Council.
- Seek removal of the Norton Rendering Plant from the North Waterfront area.
- Take actions which will reduce automobile induced emissions.

F. Recommendations on Community and Recreational Facilities

1. Policy: As a minimum, the City should maintain the current level of provision (relative to population) of facilities and recreation areas.

Actions:

- Where development sites are large, require developers to provide on-site recreation facilities so that new development will not overtax existing facilities.
- Where development sites are too small for adequate on-site facilities, require developers to contribute to a parks acquisition and development fund for the City to use in defined areas of shortage of facilities.
- Where there are portions of large sites with major recreation potential (as in the cases of the stream valleys within the Stone and Winkler Tracts), seek dedication of these portions for general public use (transferring density to remaining parts of the site).
- Acquire additional park acreage in the North Waterfront and King Street Station growth areas; fully develop as a major community park the City-owned area along Four Mile Run.